Vol. 53 OCTOBER, 1943 No. 4

CHEMICAL INDUSTRIES

The Chemical Business Magazine


Home Defense Needs Alkalies
There is scarcely a branch of civilian defense that is not dependent on alkalies and related products one way or another . . . aircraft detection . . . warden service . . . fire fighting . . . transportation . . . communication. In war as in peace alkalies are indispensable!
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For Furnace Lining . . . and Chromatographic Adsorption
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The same chemical that resists the blazing inferno of 2700°F in furnace lining is showing interesting results in separating color-body mixtures in the laboratory!
Yes, Magnesium Oxide is a versatile chemical with many new uses even though its potentialities are still only partly explored. Various degrees of calcination and preparation can change its physical and chemical properties from glass-hard, inert granules to a highly-reactive, highly-adsorptive powder. Bulk density can be from 70 lb. to as low as 10 lb. per cubic foot. Adsorptive powder can be as high as that of active carbon.
Producer of both magnesium oxide in light-burn grades from sea-water and high grade mined magnesite, Westvaco can tailor-make a grade to suit your needs. We welcome the opportunity to work with you on the use of present grades, to send samples and data on grades now made, or, to develop a new one for a specific purpose.
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The Business Magazine for Makers & Users of Chemicals

Management, Research, Production, Marketing

CHEMICAL INDUSTRIES

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OCTOBER, 1943

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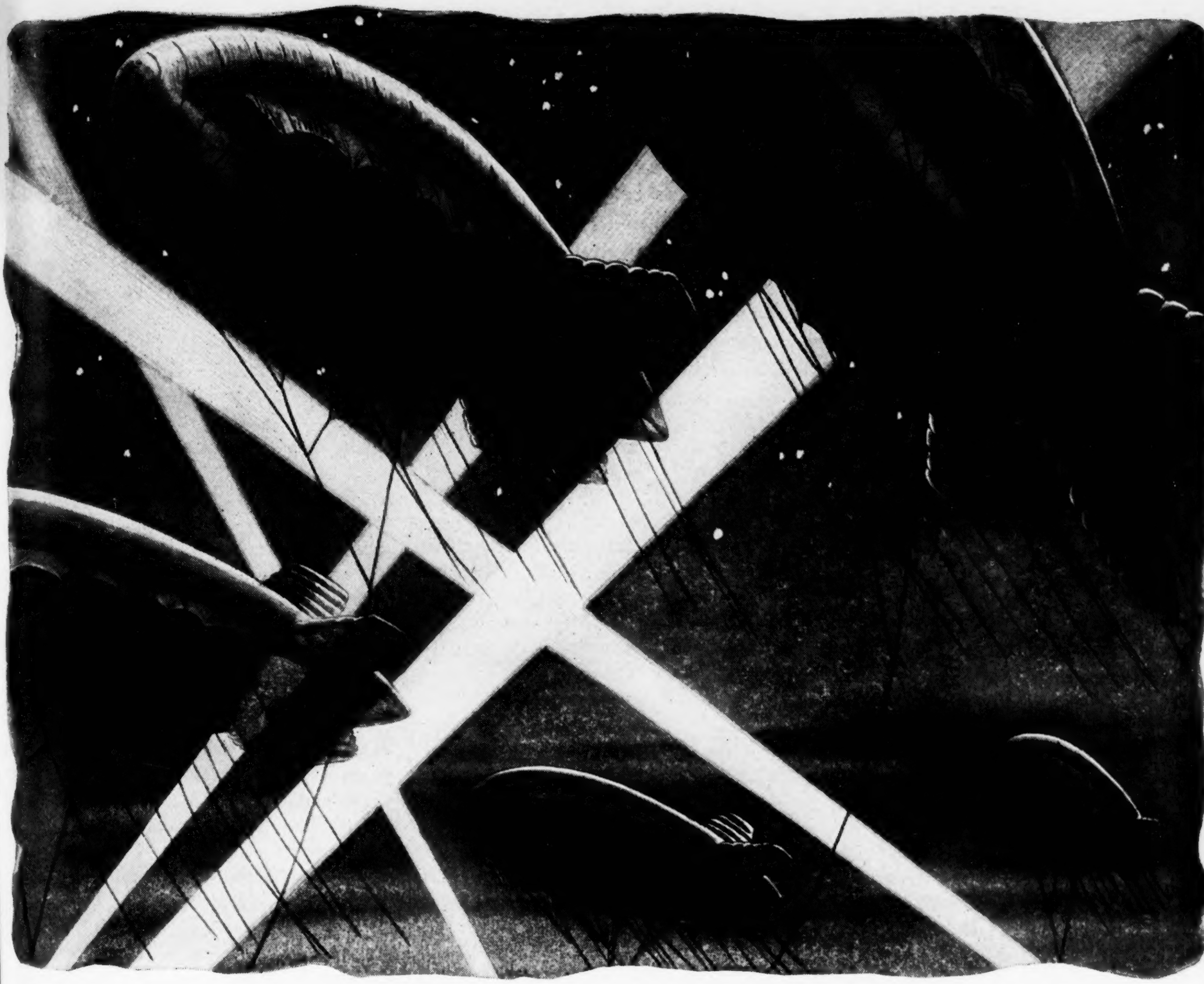

ON GUARD!

Not things of beauty, those huge ungainly barrage balloons that hover over our convoys at sea and over cities and bases overseas! But our boys know well how comforting it is to see in the sky these tough, durable synthetic rubber balloons, with their miles of steel cables, standing guard against attack by enemy bombers.

All over the world, wherever our fighting men go, Mathieson Chemicals in one form or another go with them—not only in barrage balloons, but in ships, planes, tanks, guns, gasoline and lubricants, clothing, food, medical and sanitation supplies. For Mathieson chemicals—chlorine, caustic soda, soda ash, ammonia and other Mathieson products—are vital raw materials in nearly every phase of American war production.

Today, while it goes without saying that "the needs of our Armed Forces come first," Mathieson is exerting every effort to supply materials for civilian needs as well. Tomorrow, when final victory has been won, Mathieson will again stand ready to render its normal peace-time service to American industry.

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BETWEEN THE LINES

Raw Materials Uncovered As Armies Advance

As the United Nations armies drive the enemy from occupied territory raw materials and chemical products will again become available. The Sicilian and Italian campaigns have already uncovered a windfall of argols, tartrates and essential oils. There are prospects for recovery of fats and oils from the South Pacific area. Japanese capture of Java's oil of citronella has greatly affected production and supply setup in American peppermint oil.

IT is too early to estimate what might accrue to the United Nations in the way of critical or essential chemical substances or materials, incident to their recovery of areas recently held by enemy forces.

The general impression has prevailed that such regions had been very thoroughly looted, so that nothing would be found beyond bare rock and earth. Surprisingly enough to those holding such impressions, Sicily has been an exception, though to what extent has not been revealed as yet.

It is known that some quantities of argols, citric acid, and other materials have been uncovered by the American and British occupation. These, with tartrates and what essential oils found, are a boon at this time, because of the uncertainties in the domestic production outlook under some of these headings. A report of an industry committee is currently anticipated showing the progress of the domestic wine producing areas in supplying tartrates, among other items.

Meanwhile, the Sicilian windfall may be in substantial amounts. It is reported to be sufficient to be included in the allocation pool. This means that the argols, essential oils, and other supplies recovered, will be allocated direct to United Kingdom and other allied users, and the amounts so disposed deducted from Lend Lease or other allocation schedules from this side of the water.

Nothing has been said as yet, as to the prospects for recovery of fats and oils from newly re-won South Pacific areas. War industries, and fine chemicals users in this country are still suffering the effects of the Japanese occupation of some sources of these materials formerly supplying American and other users this side of the Pacific.

One such chemical is menthol. Formerly natural menthol was imported from Japan. Until about eight years ago, natural menthol was the only kind used. Then synthetic menthol began to be used, and admitted into the U. S. Pharmacopoeia, in competition with the natural product. Nevertheless, this did not free American users from dependence on foreign sources for menthol.

The raw material used for synthetic menthol is oil of citronella, Java, an exotic, volatile substance produced only in the Dutch East Indies. A glance at the South Pacific war maps, showing Japanese dominance at the moment, will give the answer on what happened to that source.

This has reacted directly on an important American essential oil—oil of peppermint. While Japanese oil of peppermint is poorly regarded on the flavor score, it is high in menthol content. The American plant is the reverse. The plants grown in this country for essential oils are the flowering peppermint and spearmint plants, the two principal plants of the former being *Mentha piperita* and *mentha arvensis*. The spearmint plant is known as *Mentha spicata.*

Two states, Michigan and Indiana, produce over 90 percent of the plants grown commercially, although California, Oregon and Washington, and some small amounts from northwestern Ohio, add to the total. Plantings run from one acre to 1,000, although 40 to 60 acres is regarded as average. Plants are cut* and distilled on the farms, giving natural oil of peppermint or spearmint.

Essential oil dealers in the locality usually buy this initial product, although some sales are reported to be made to New York essential oil buyers, or those in other large cities. The local dealers however, sell both to the firms in the larger cities, and to manufacturing consumers. Some also do some rectifying and production of more highly fractionated oil, on their own account.

In the order of their importance the principal industrial users of the various grades of peppermint and spearmint oils are: chewing gum, dentifrice, candy, pharmaceuticals and confectionery. Normally the nation's requirements amount to about 1,000,000 pounds annually. Due to war demands, over those of normal times, including Lend-Lease and other new consumers, the demand today is several times that figure, and there is a serious shortage.

This has led to actions by several Federal agencies; the War Food Administration in September issued Food Distribution Order 81, reserving all peppermint oil for government disposition. Persons owning over 25 pounds were required to report holdings by September 28, so that during the current month there should be a current picture of supplies. A short domestic production due to unfavorable weather has further necessitated a tight control of supply, and a complete picture of available stocks.

On September 30 the Office of Price Administration followed with MPR 472, establishing specific maximum prices for sales of the natural oils by growers of the plants from which distillation was made. Until now, these sales had been exempt, as there had apparently been no necessity for ceilings at grower levels.

Inflationary trends were setting in, however, which threatened to disrupt normal marketing of these oils, and which the regulation is designed to check. Manufacturers of menthol products and of menthol, particularly, were reported to have begun heavy purchases, regardless of price. Other users were following the same bent. Certain dealers, as well as smaller consumers were feeling the pinch.

A somewhat similar trend was noted in another fine chemical, methyl salicylate, which has the characteristic odor and taste of wintergreen. About $500,000 worth of this chemical is produced annually, but war-time limitations on the use of phenol—used in production of salicylic acid, a component of synthetic methyl salicylate—resulted in a tight supply this year.

Some jobbers, facing this situation, had launched disruptive price campaigns, so that again, OPA late in September brought this chemical under ceilings, which became effective at the end of the past month.

Synthetic methyl salicylate has a wide range of uses, from medicaments and flavorings to use as an aromatic in deodorants, disinfectants and sprays, and as an ingredient of penetrating lubricants. No figures of recent date are available on amounts going into the various categories.

There are only a few producers, with output very stable until about 1940, when it increased sharply during 1941, declining slightly in 1942. This decline is attributed to the restrictions on phenol which were inaugurated about that period.

Its distribution is very similar to that of other fine chemicals covered by recent OPA regulation. Producers sell directly to industrial consumers, and among others, to essential oil dealers. Except for the special class of jobbers mentioned, and their practices which have forced up

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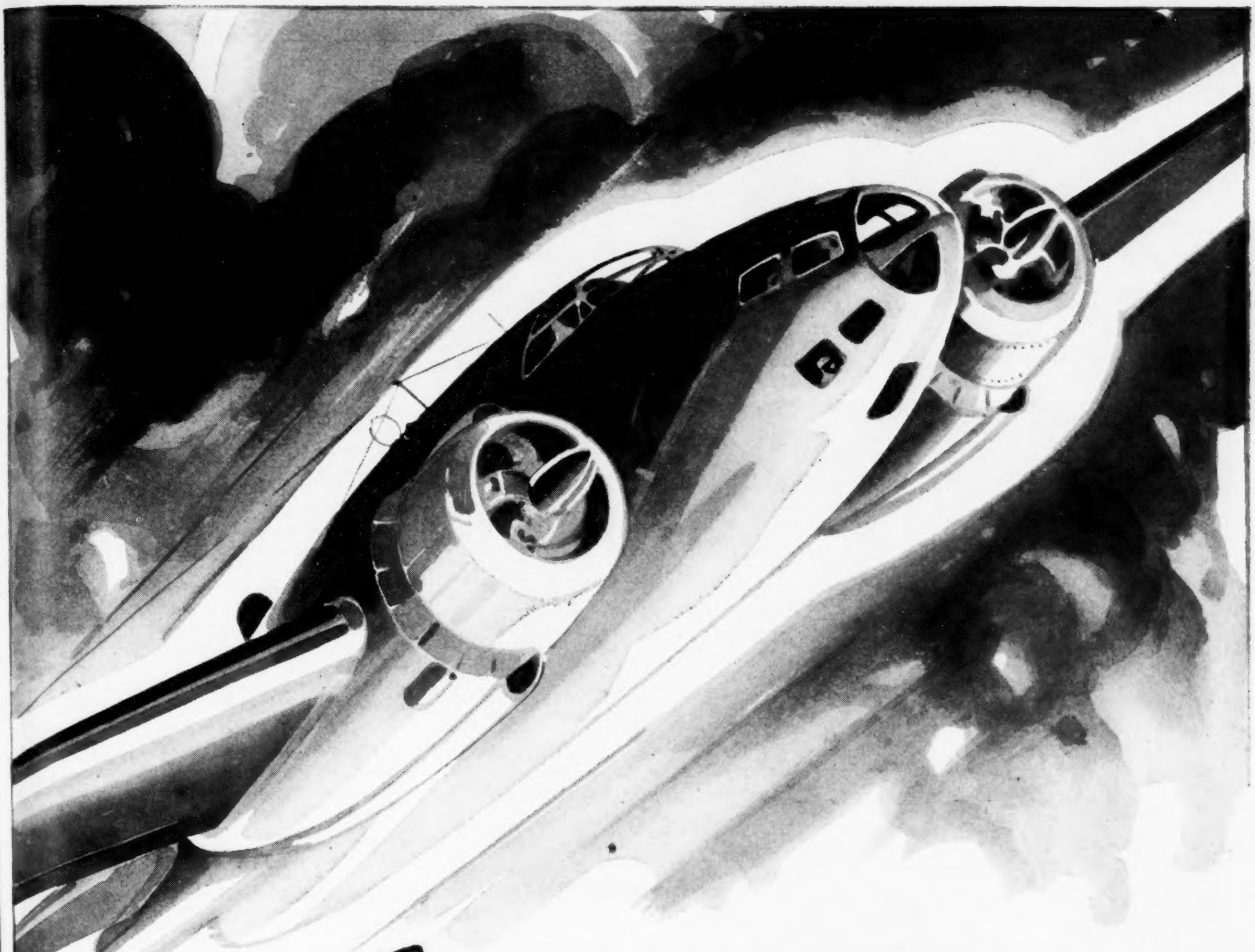
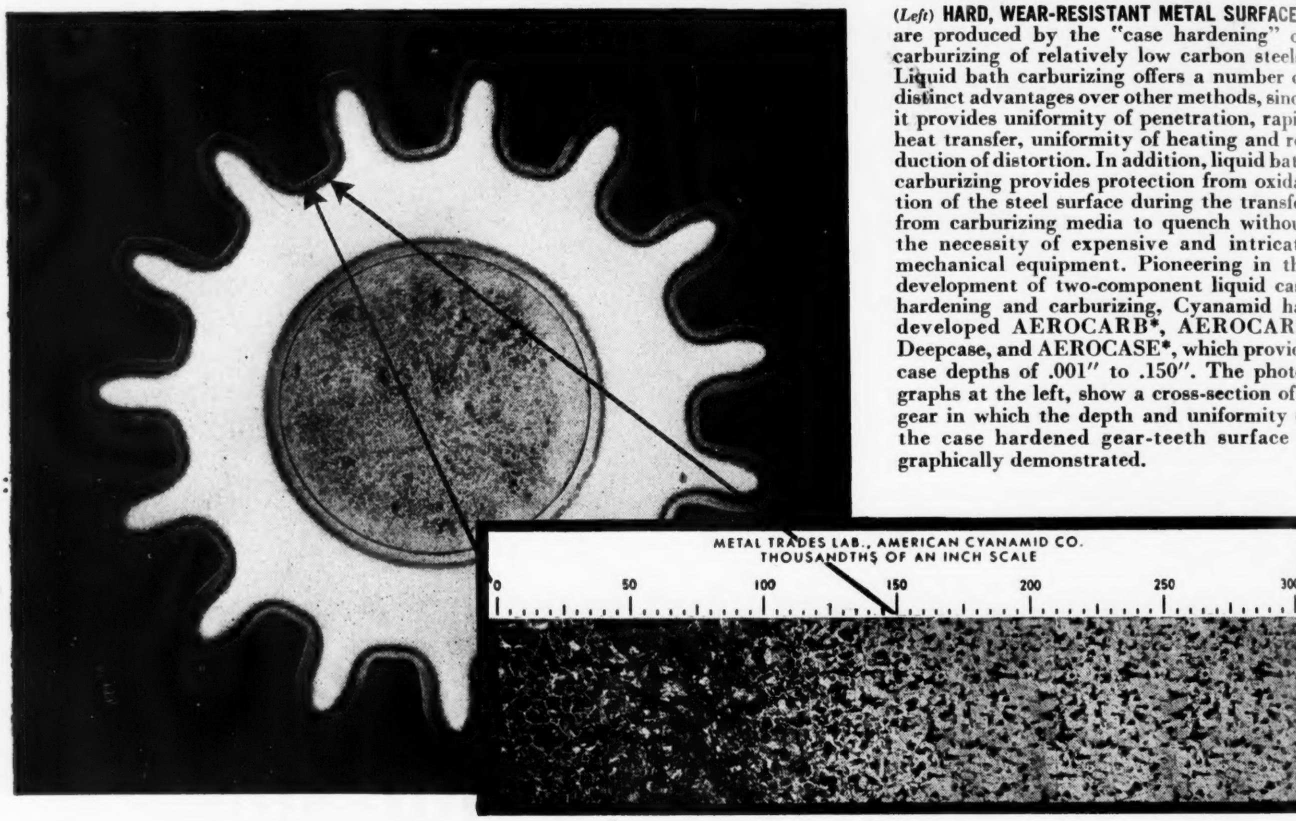
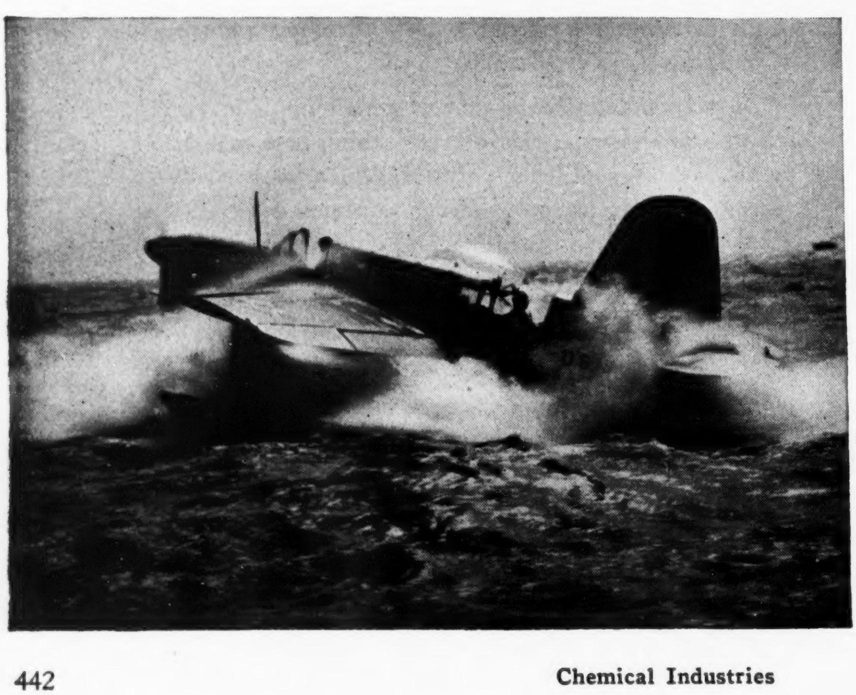


Life On The



(Left) **HARD, WEAR-RESISTANT METAL SURFACES** are produced by the "case hardening" or carburizing of relatively low carbon steels. Liquid bath carburizing offers a number of distinct advantages over other methods, since it provides uniformity of penetration, rapid heat transfer, uniformity of heating and reduction of distortion. In addition, liquid bath carburizing provides protection from oxidation of the steel surface during the transfer from carburizing media to quench without the necessity of expensive and intricate mechanical equipment. Pioneering in the development of two-component liquid case hardening and carburizing, Cyanamid has developed AEROCARB*, AEROCARB Deepcase, and AEROCASE*, which provide case depths of .001″ to .150″. The photographs at the left, show a cross-section of a gear in which the depth and uniformity of the case hardened gear-teeth surface is graphically demonstrated.



(Left) **TO GUARD AGAINST** structural failure resulting from salt water corrosion, the exposed surfaces of aluminum alloys in airplanes are protected against corrosion by an under coating of a zinc chromate primer, an essential ingredient of which has been chinawood oil. A recent announcement of the Chemicals Division of the War Production Board, however, precludes use of chinawood oil for alkyd resins used to make these essential aircraft primers. Cyanamid's foresighted "replacement research" has developed REZYL* 727-5 and REZYL 728-5, two new resin vehicles, produced without critical oils. These have proven efficient substitutes in production of fast-drying zinc chromate primers that meet the rigid requirements of U.S. Army and Navy specification standards. In the latest issue of "Specification Finishes," Cyanamid has undertaken to accurately correlate U. S. Army, Navy, Maritime Commission and other "Specs" with the specific resins that will meet these requirements. Complete suggested formulations are given for many of the more important specifications. A copy of "Cyanamid Resins for Specification Finishes" may be obtained on request.

WASHINGTON

By T. N. Sandifer

War Production Board's Plan to Decentralize

DESPITE the rather enthusiastic prognostications from interested officials that accompanied the recent announcement of War Production Board's plan to decentralize certain activities, the step is regarded with some reserve by others.

In substance, the plan calls for establishment of the 13 regional WPB offices into semi-autonomous organizations, the present "directors" of which would be raised to status of chairmen to further emphasize their authority in their respective jurisdictions. These offices would process all PD-1 applications up to $10,000 according to one projection of the plan, in place of the present limit of $1,000 in advance.

T. N. Sandifer

As grounds for the move WPB enthusiasts claimed a possible 33 per cent reduction of travel now necessary on the part of business men to and from Washington, and a reduction in their paper-work load incident to war regulation, of between 25 and 40 per cent. Greater speed of WPB operations also was seen possible.

There is already evident at Washington a number of vacant desks around WPB, with the explanation that former occupants are moving to one of the 13 regional headquarters, or 92 district offices over the country, under the new plan. The expectation heard voiced here is that it will be necessary to still further augment these Federal staffs, though working in geographical areas of the country far removed from Washington.

Accordingly a note of skepticism is heard here and there, in comments on the move. It may seem premature on the part of such commentators, to bring up 1944 in a political sense, but everyone in this city is beginning to look at matters in this light, hence any proposal to build up patronage organizations, or just plain Federally-paid groups, in the States, is automatically suspect.

It may not be a fair parallel, but the idea is found in it nevertheless, to recall that Chester Bowles, general manager of the Office of Price Administration recently found it necessary to instruct his local offices over the country to prohibit political activities on the part of the local War Price and Rationing Boards wherever such activities conflict with public interest. He had to admit, at the same time, that drawing a hard and fast line as to what constitutes a political activity contrary to public interest, is a difficult matter.

This stricture referred only to local staffs, presumably all community residents, but it suggests a question as to Federal staffs in the same communities, and this question is in the minds of some as to the decentralized WPB.

In its more technical aspects, there is a disposition to watch and see how decentralization of important WPB functions will work out. To effect a closer tiein with Washington on broad policy matters, the Regional Chairman will work directly with a newly-established Operations Council in Washington, which is under WPB, and a new Field Service headquarters in the Capital is intended to channel pertinent information and services to the regional and district offices. How this will solve allocation matters involving transfer of vital materials from one jurisdiction to another, when both want them, is another question that has been raised.

Finally, a strong suspicion is apparent in some quarters, though not in WPB of course, that the whole thing is ephemeral. Before taking it too seriously, in short, it might be well to see if it will continue in existence longer than a few months.

Contract Renegotiation

Of wider interest in all industries concerned with the war is the still pending legislation modifying war contract renegotiation, and containing a standard termination clause which is still in the drafting stage. Senator Murray has ready a companion bill to HR. 3022 described here in a previous issue, designed likewise to provide for "prompt and liberal" advance payments, both to the prime contractor and his subcontractors.

The post-war aspect of the subject is being shoved into the background by the increasing worry to business over current cancellations and cut-backs. Meanwhile the War Department has been active in the situation on its own account, first with its directions in Procurement Regulations 15, as to basis on which a prompt determination and payment of amounts due under contracts, can be made, and in creation of a Renegotiation Division in the Army Service organization. The latter division will handle phases of renegotiation formerly carried on by the Price Adjustment Board.

Manpower

On the manpower problem, insofar as chemical personnel is concerned, War Manpower Commission expects to make up this month some recommended revisions of a bulletin that will attempt to meet the requirements of this particular industry. It is uncertain how soon this bulletin will be issued, or just what revision will be made. At this writing they had not been approved, pending a meeting to be held later in the month.

Allocations

Distribution of chemicals for civilian use in September amounted to well over $100,000,000, keeping pace with those in August. Some time ago the Chemical Division of WPB formulated tentatively what became known as a non-CMP plan, to deal with allocations of chemical materials not under CMP itself. What it amounted to, in the opinion of officials concerned with it, was a "hunting license," but its ostensible purpose, so its advocates said, was to ease the paper-work load.

It was necessitated, according to report, by industry complaints as to excessive paper work. However, according to one official in Chemical Division who studied this aspect of the matter, relatively few such complaints are said to have come to the division itself. According to the same source, chemical allocations are working smoothly, not only at Washington but in the field, and the industry appears to like the positive action resulting from allocations, as in the case of those industries which get their materials through CMP.

On the other hand, it is feared in some quarters that the proposed plan, if adopted, would lead to much confusion, far out-weighing any difficulties arising

(*Turn to page 572*)

Wonder of the Western World

Few regions in America have had such a dramatic history as that which centers about Niagara. It was strategic territory from the time of its discovery by the LaSalle Expedition in 1678, in the struggles during the French and Indian Wars and the Revolution. Today it is still a strategic territory, in that it is an area of vast industrial activity from which America derives electric power and great quantities of materials, such as chemicals and other products essential to the successful waging of the war.

As a chemical company noted for its pioneering activities, Niagara Alkali Company carries on the traditions of this region through the stepped-up production of essential chemicals and energetic cooperation with the industries that use them.

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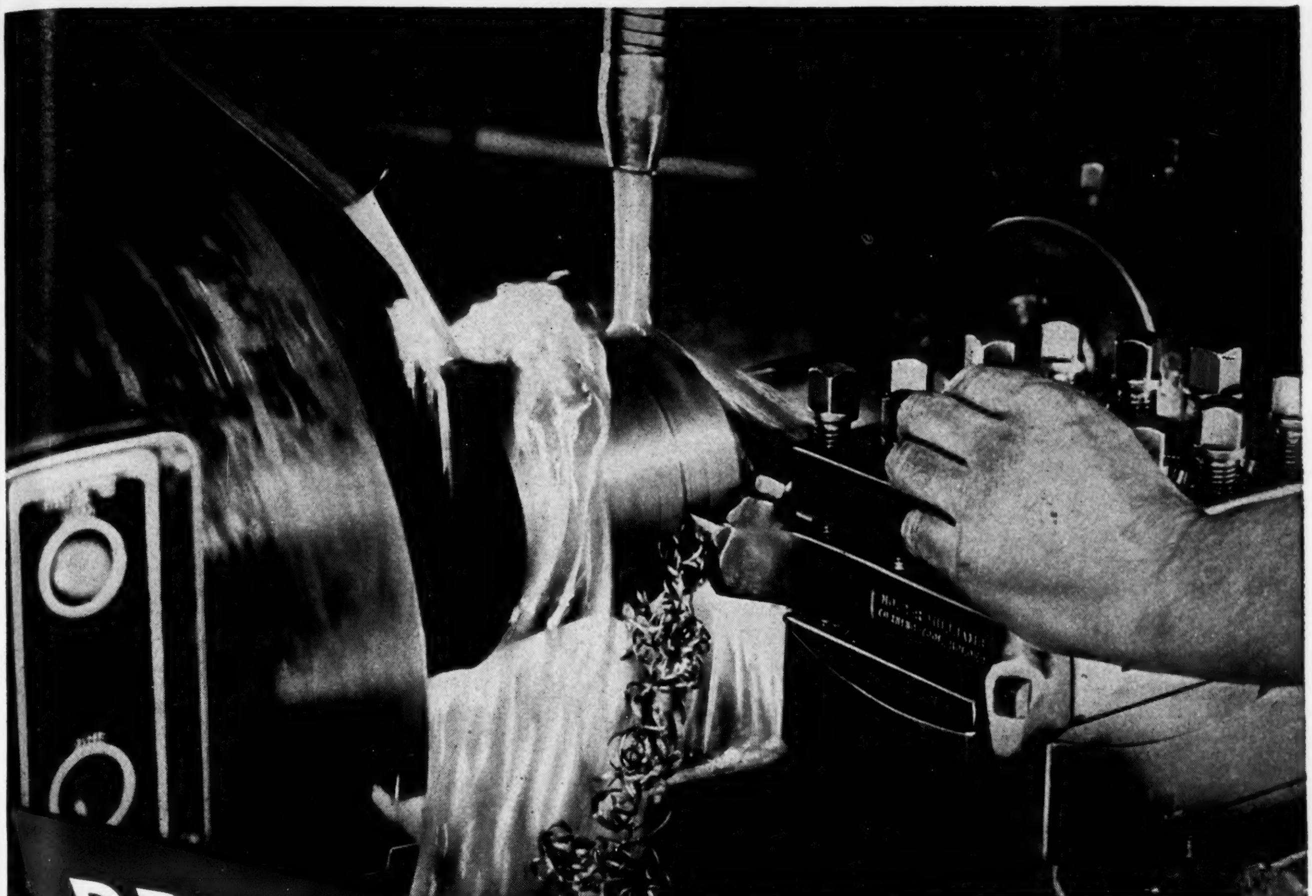
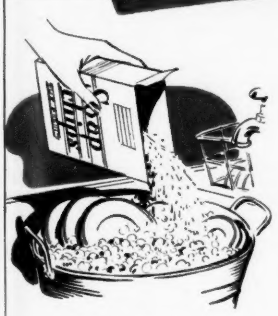
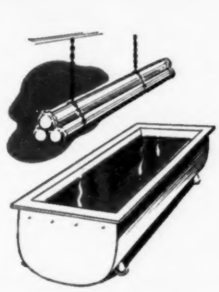


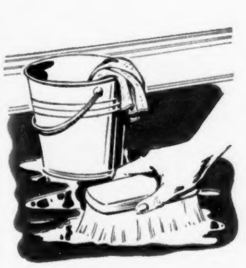
DRESINATES* ...for low-cost Oil Emulsions



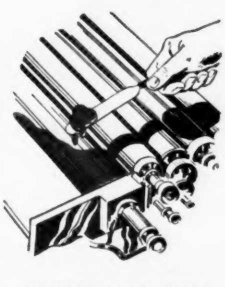
IN SOAP



ALKALINE METAL CLEANERS



FOR DISINFECTANTS



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These new Dresinates are, in fact, useful and economical for a long list of products . . . including soaps, disinfectants, alkaline metal cleaners, emulsion paints for floor coverings, pigments, inks, pyrotechnics. To obtain technical data, and samples suited to your particular requirements, fill out the coupon below and mail today.

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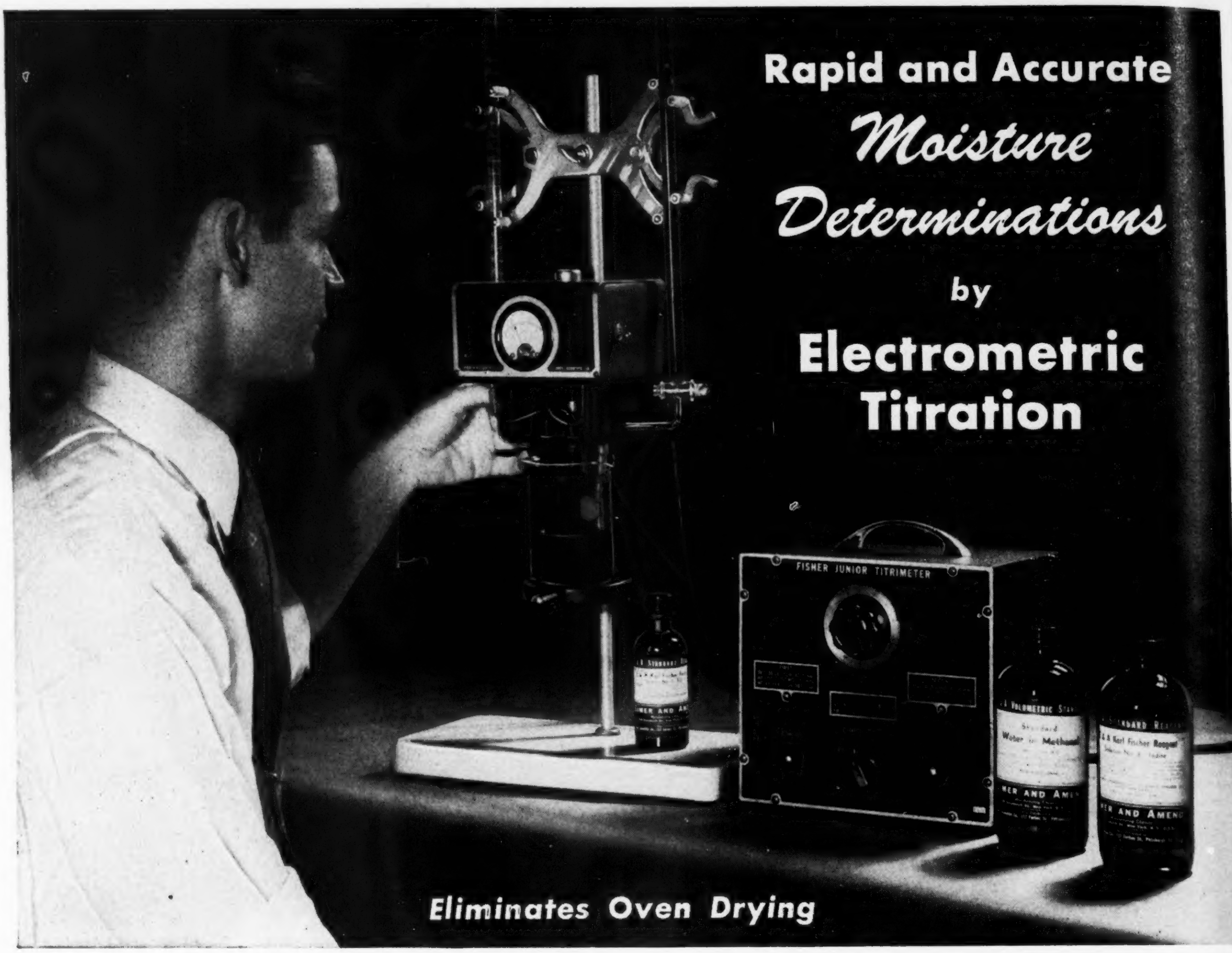

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ORGANIC LIQUIDS: alcohols, ketones, esters, oils, fats, petroleum fractions, etc.

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E.&A. Karl Fischer Reagent employed in the electrometric titration of moisture saves hours of time otherwise employed in oven drying of samples of liquids and solids of all types. It also eliminates errors due to oxidation and decomposition of samples.

Eimer and Amend's laboratories have prepared an improved Karl Fischer Reagent, and have made it generally available.

E.&A. Karl Fischer Reagent, in two bottles for mixing immediately prior to use, with directions.
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The purity and dependability of many Diamond products is of great value where used for medical purposes. Bicarbonate of soda and Liquid Chlorine are two Diamond products used in the manufacture of medical aids.
Shown here are a few of literally hundreds of applications of the Diamond Alkali Company's products now being used in war service. From the production of basic raw materials, to front line service, our products are helping the march to Victory!
This naturally means that civilian uses must wait until military and war production requirements are satisfied.
The same high quality and dependable uniformity that made Diamond Alkali products the first choice of experienced plant officials during peace times, now serve the operators of Uncle Sam's "Arsenal of Victory."
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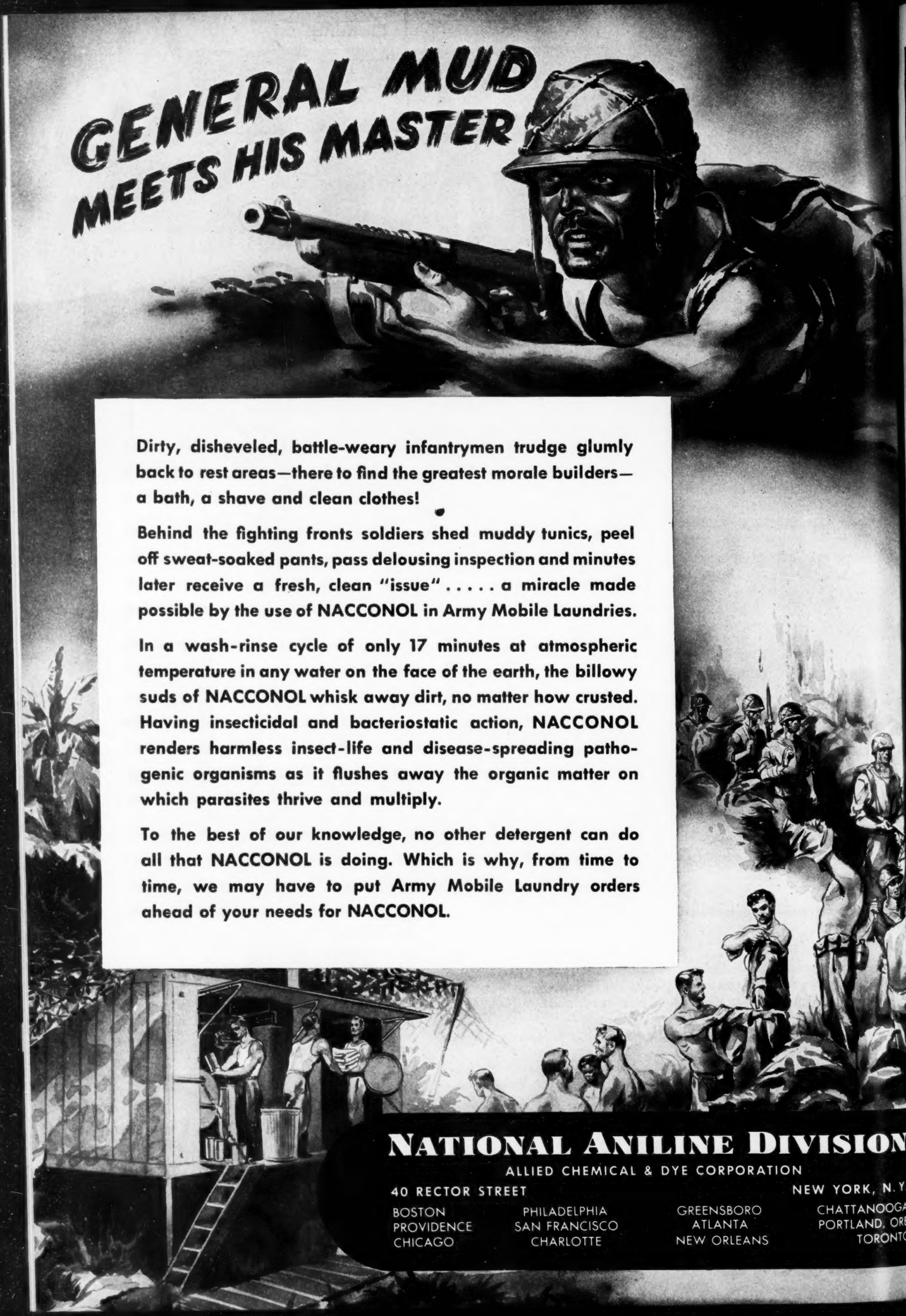
In the manufacture of armament, munitions and war materials, Diamond products are widely used—from steel making to cleaning finished parts.
ALKALI


GENERAL MUD MEETS HIS MASTER
Dirty, disheveled, battle-weary infantrymen trudge glumly back to rest areas—there to find the greatest morale builders—a bath, a shave and clean clothes!
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To the best of our knowledge, no other detergent can do all that NACCONOL is doing. Which is why, from time to time, we may have to put Army Mobile Laundry orders ahead of your needs for NACCONOL.
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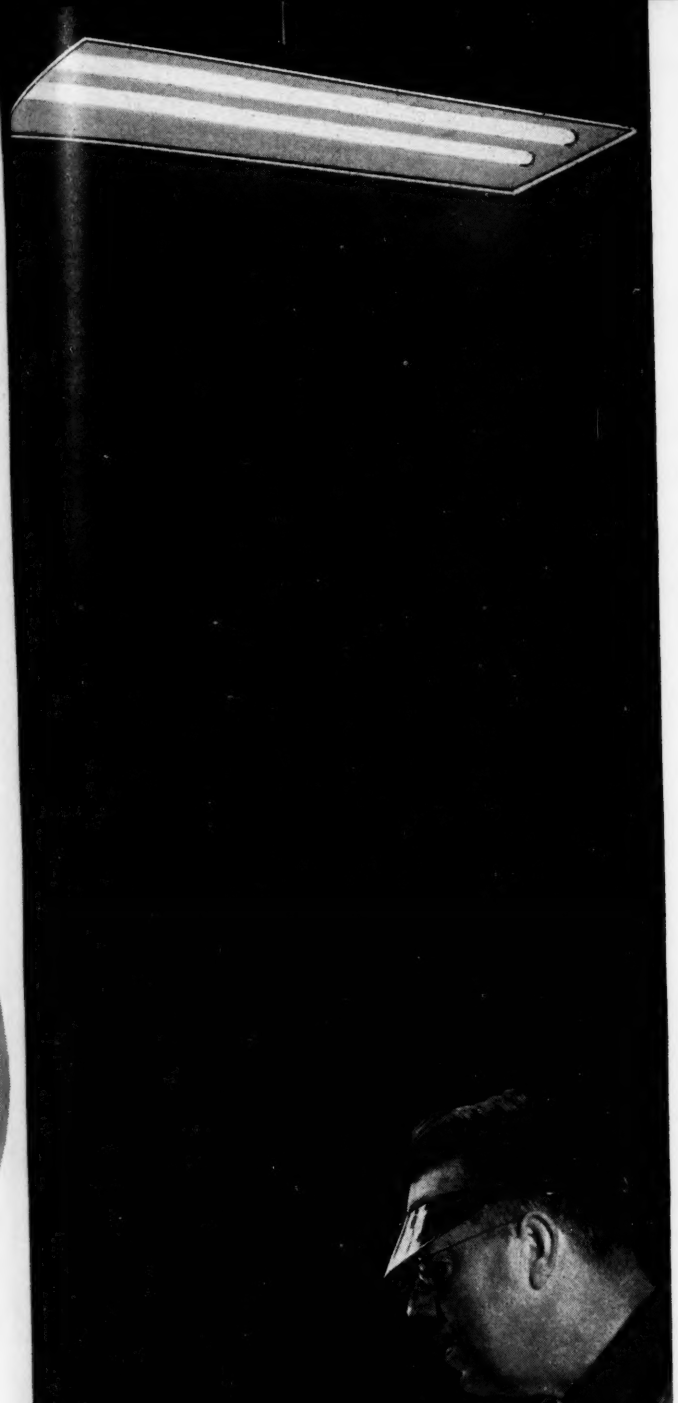
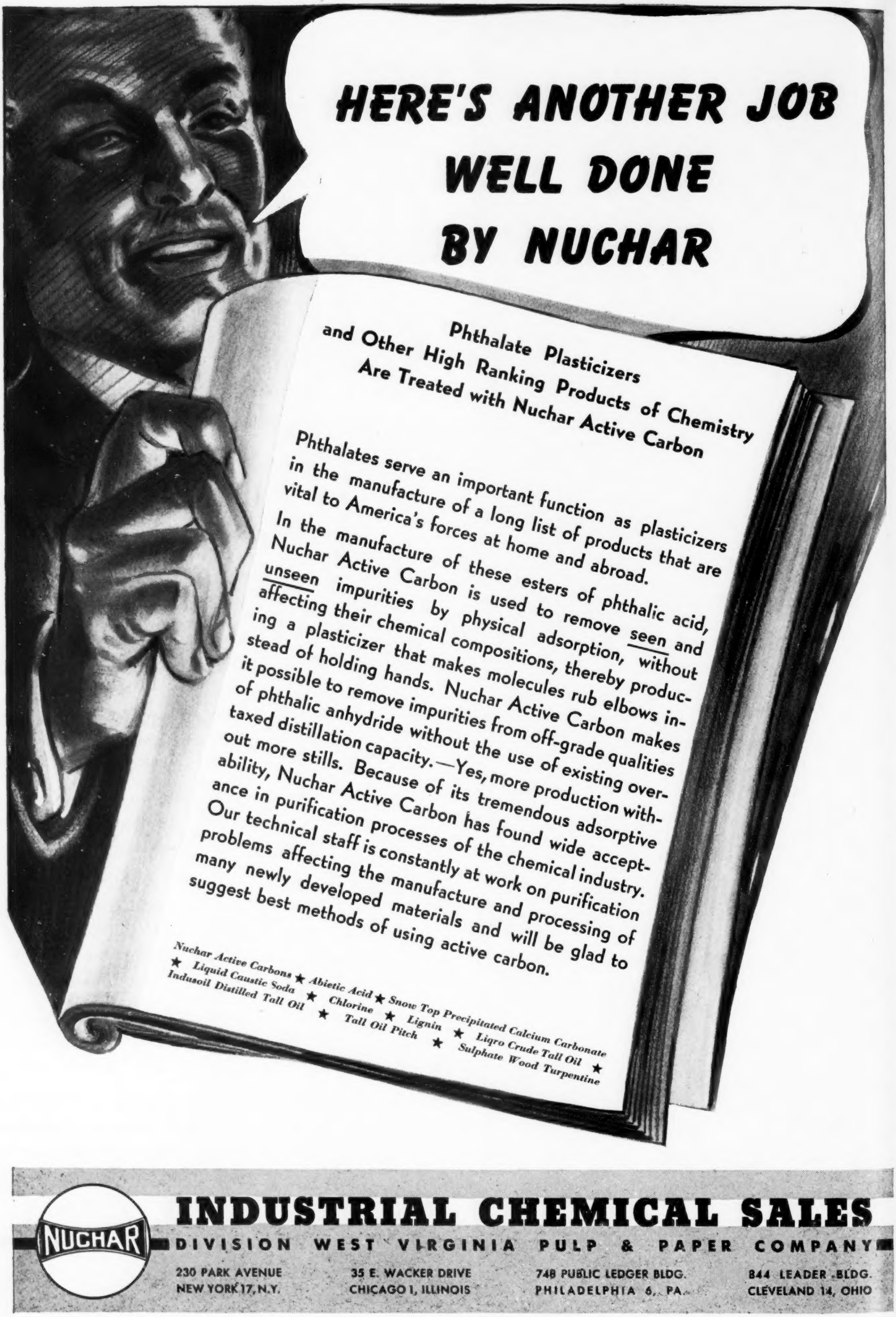

ANALYZED REAGENTS
Baker's
FINE CHEMICALS
Baker's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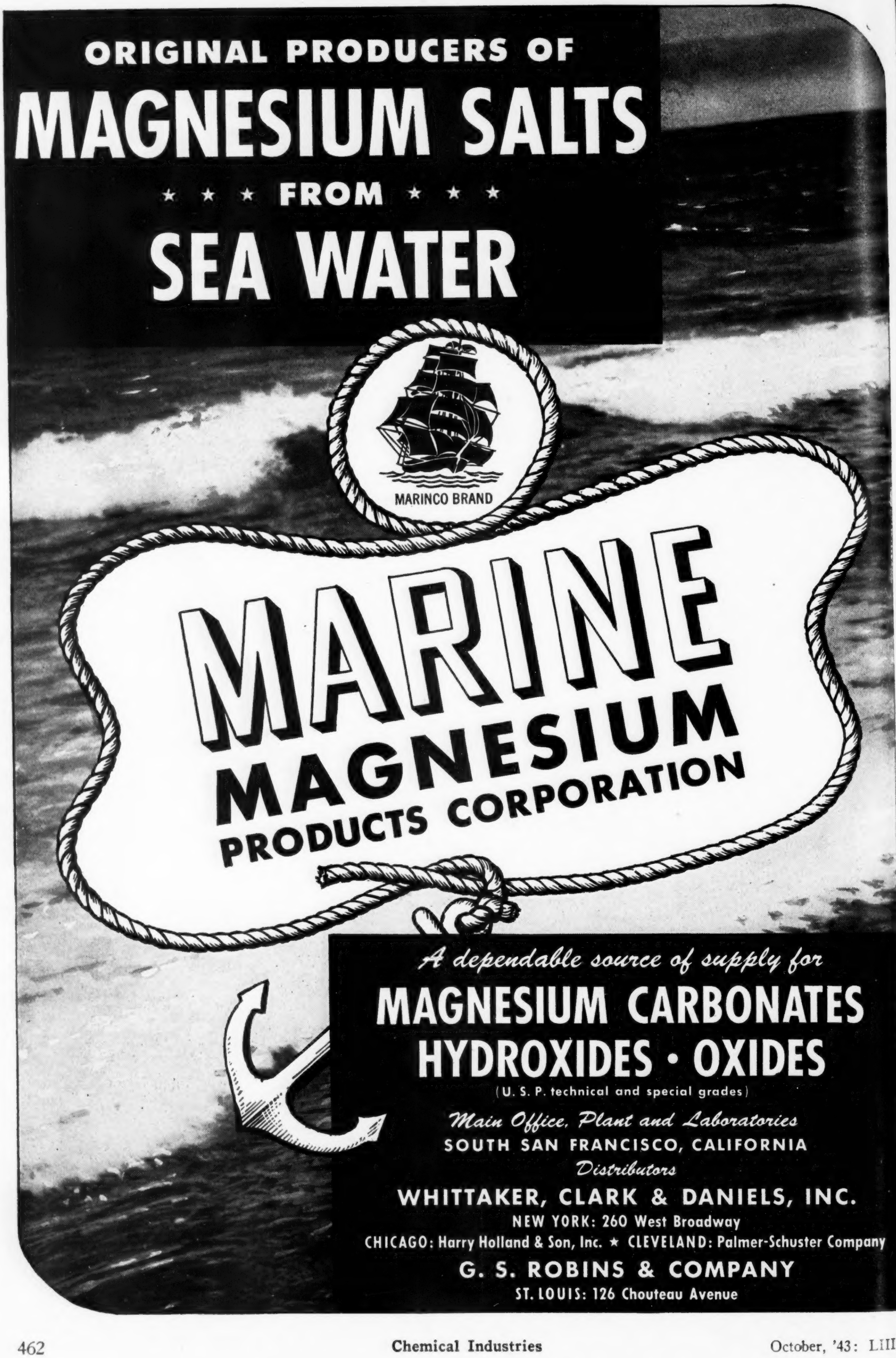
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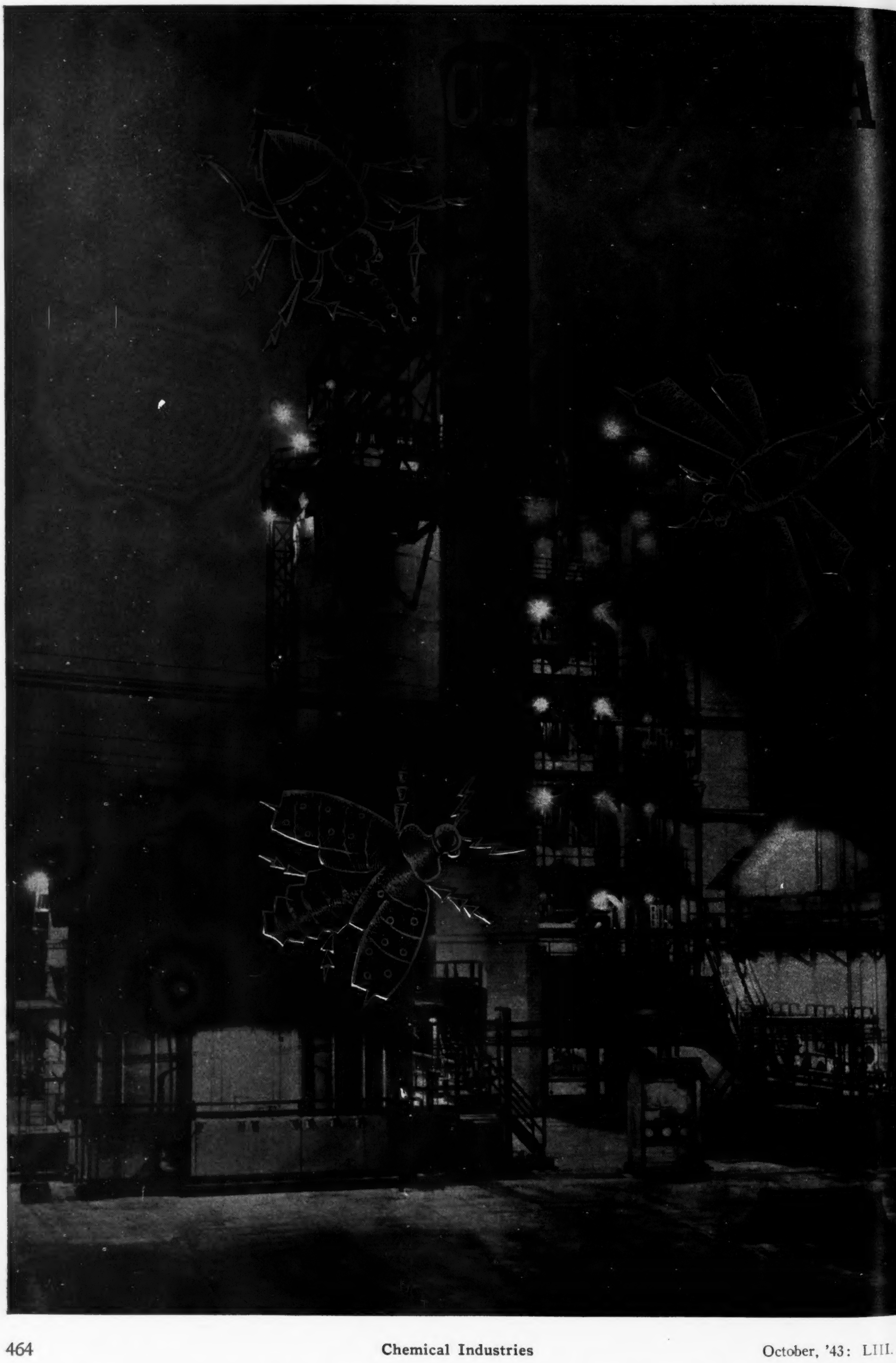

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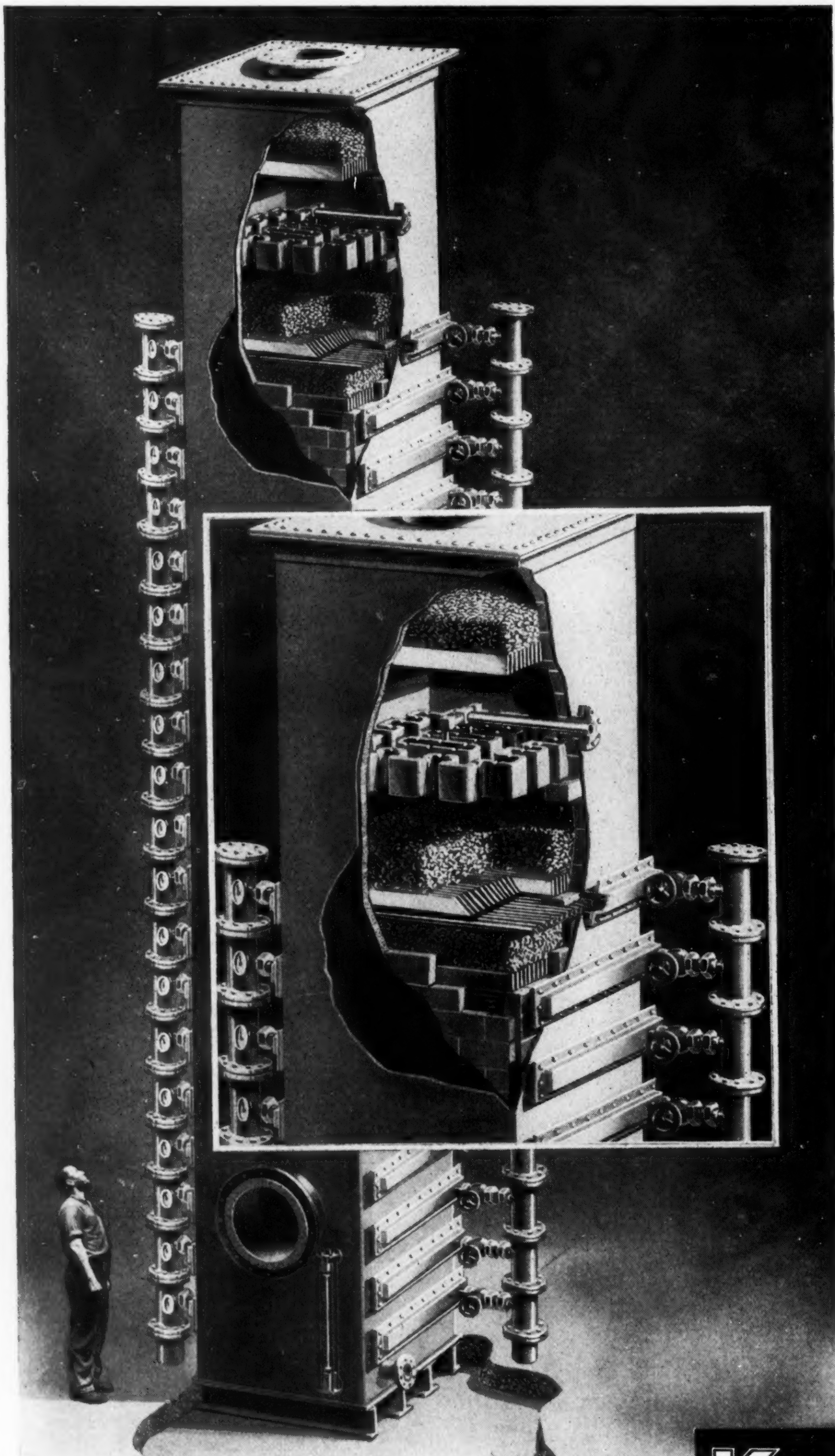
provide the strength of steel and the corrosion resistance of ceramics



The above Pyroflex Functional Unit is a muriatic acid absorption tower 6' by 5' by 33' high designed to have a capacity of 4,200,000 BTU per hour to produce 360 tons of 31% acid per day from 22% HCL gas.

DEVELOPED over 10 years ago, Pyroflex Functional Units provide corrosion-proof equipment beyond the size and service limits of chemical stoneware. A variety of tailor-made units, designed to do specific jobs, have provided the first satisfactory solution for many tough problems.

In essence, Pyroflex Functional Units combine the structural strength of steel or concrete with the positive corrosion resistance of ceramics, carbon or glass. Pyroflex itself is a thermoplastic sheet lining resin which acts as a bonding agent, an expansion cushion and a corrosion seal at the same time. We sell Pyroflex not by the sheet or pound but by the lining installed or the complete vessel.

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Among various types of Pyroflex equipment in service are the following: wood pulp chlorinator towers, electrolytic refining tanks, steel mill pickling tanks, electrolytic plating tanks, muriatic acid system coke boxes and gas cooling towers, acid boiling kettles, acid absorption and rectification columns, acid fume washers, acid storage and reaction tanks, floors, sewers, troughs and neutralizing collection basins.

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Knight engineers' wide experience in solving corrosion problems and developing acid-proof equipment for chemical manufacturing enables our organization to render you a real service on your own special problem if you will give us complete details.

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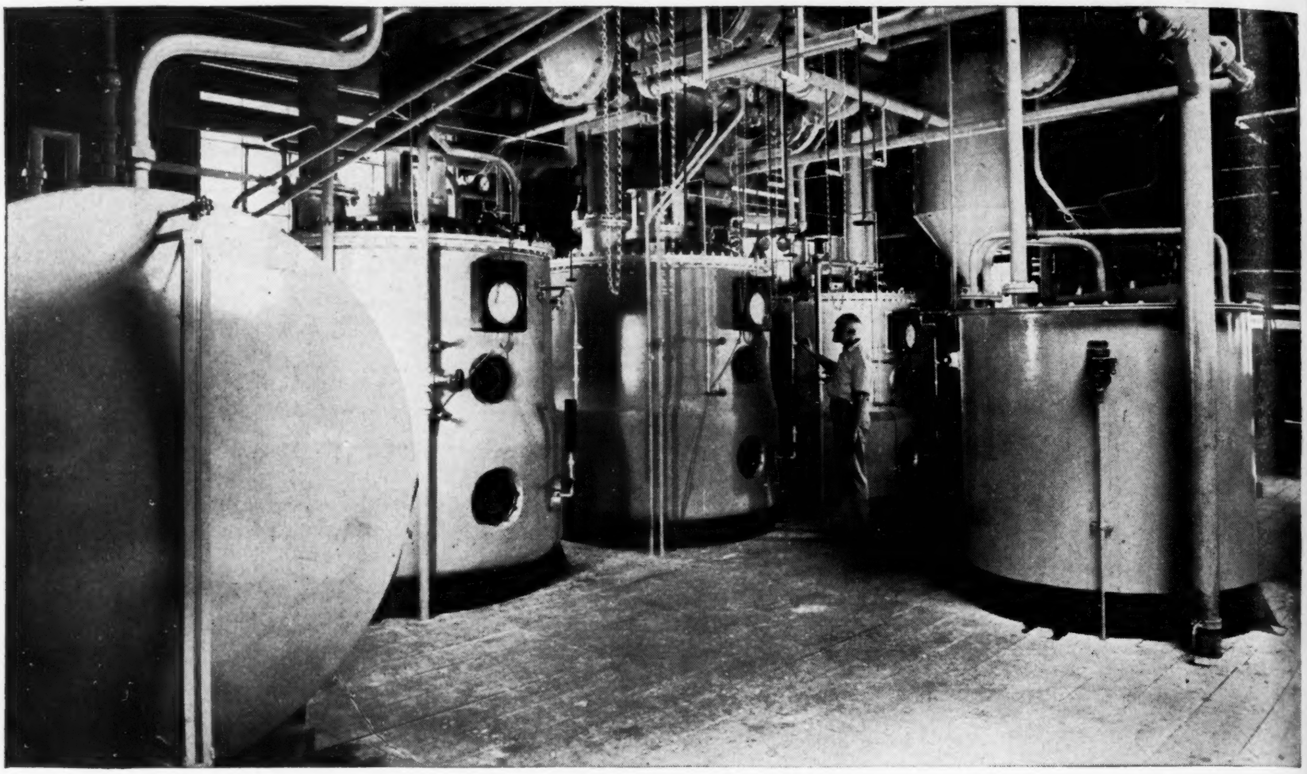
KNIGHT-WARE
CHEMICAL EQUIPMENT



Industrial Products by Fermentation Processes

• Noah has received credit for one of the earliest recorded chemical discoveries. He found that under some conditions grape juice underwent a change and the resulting product, when imbibed, produced a pleasant physiological effect entirely different from that which the original juice gave. Unfortunately, as a result of continuing his testing "not wisely but too well", he has received some undesirable notoriety.

It was also observed at an early date that sometimes fruit juices underwent another type of change which resulted in the development of sourness. Milk was also found to become sour on storage. Since the resulting products found practical use, empirical methods of regulating these alterations were developed.

Not until the investigation of Pasteur was it recognized that these changes were due to the growth of various microscopic organisms. It had been noticed earlier, however, that the development of visible organisms, termed molds, also resulted in changes of the medium on which they grew.

Since Pasteur a large number of experimenters have developed methods not only of preventing, but also of encouraging the growth of these organisms, both visible and microscopic. Others have studied the chemical changes brought about by them. It is now recognized that these reactions are similar to, or in many cases the same as, those occurring during the development of a fruit or vegetable and are natural vegetative processes.

As a result of some of these researches a considerable variety of products of industrial importance is now being manufactured by the careful cultivation of a number of these organisms. Since this is a comparatively new field, it can safely be assumed that with time the number of compounds produced by such methods will be greatly enlarged. The probability of this is increased by the fact that the raw materials for such processes are generally of American agricultural origin, thus removing any dependence on foreign products.

Chas. Pfizer & Co., Inc. has been one of the leaders in this field and is at present producing Citric Acid, Gluconic Acid, Fumaric Acid, and Oxalic Acid by such methods. From these acids a wide variety of derivatives is being manufactured. A well-trained research staff is engaged in the improvement of present processes and in the development of new products. Results in many of these latter investigations indicate that products of possible importance in a variety of fields will in time be made available.

MANUFACTURING CHEMISTS • ESTABLISHED 1849

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Masterpieces OF POTTERY

IN THE 19th century it was uniformity of shape and texture that put English pottery at the top of the industry. It is uniformity today that makes General Ceramics Chemical Stoneware preferred equipment in leading chemical processing plants and laboratories. Each piece of stoneware is molded with uniform care and tested with rigid thoroughness—an unseen feature, that is responsible for the resistance to rough handling and unusually long life of every General Ceramics product. Uniformity is only one of General Ceramics outstanding features. In addition, General Ceramics Chemical Stoneware is acid-proof throughout, a quality which, in the handling of strong chemicals and corrosive liquids, insures property and personnel against dangerous leakage. Its hard, glazed surface is easy to keep clean and thus contamination of your product is easily eliminated.

Among the numerous products manufactured by the General Ceramics Company for industrial application are acid-proof pipe, valves, fittings, kettles, jars, pots, pumps, exhausters, coolers, condensers, acid elevators, towers, filtering equipment and tourills.

FIG. 114
STONEWARE
STORAGE VESSEL

Other products include Steatite Insulators made by General Ceramics & Steatite Corp., Keasbey, N. J.

General Ceramics Co

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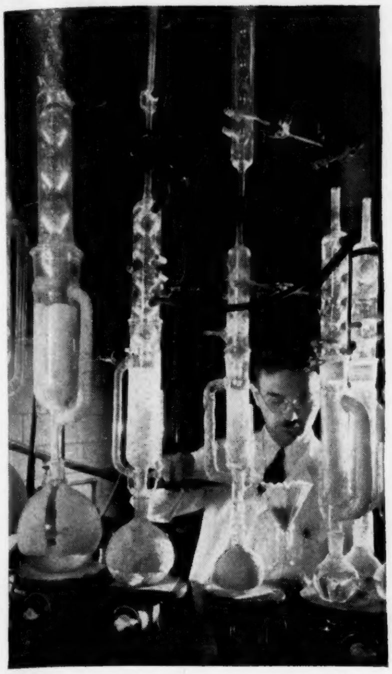
CERAMICS COMPANY
CHEMICAL STONEWARE

CHEMICAL STONEWARE DIV.

KEASBEY • NEW JERSEY

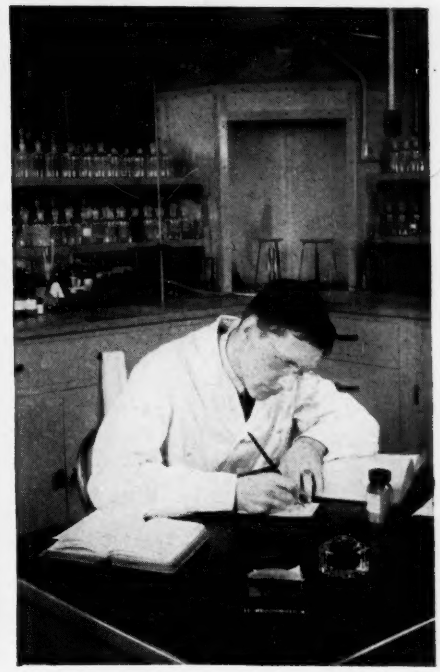

Judge and Jury on package design
The success or failure of a package design is up to the American homemaker. And, she wants her packages handy as well as attractive.
As evidence, a recent survey by a nationally known research organization reveals that 85.4% of the women want packages with pouring spouts.
This is why retailers report that neat, attractive Deltaseal Bags with their handy pouring spout feature make many steady customers for products they carry.
BEMIS
Deltaseal
BAGS
PULL
CUT
POUR


INSIDE JOB...



Merck Ephedrine is the result of extensive chemical research.

A step in the production of Merck Ephedrine on a commercial scale.



The purity and uniformity of Merck Ephedrine are ensured by rigid laboratory control.

Merck EPHEDRINE

- **It is identical with the natural alkaloid.**
- **It is officially recognized by *The United States Pharmacopoeia.***
- **It is independent of foreign sources of supply.**

AN important contribution to the American chemical industry was the evolution of Merck Ephedrine, and its production on a commercial scale. This product, *identical with the natural alkaloid* and officially recognized by *The United States Pharmacopoeia*, established an independence of the foreign source of supply for American consumers. Pharmacologic and clinical tests have proved that its action and therapeutic effects are identical with those of the natural product.

Merck Ephedrine is available in the form of the hydrochloride and sulfate, for use in powder, capsules, nasal jellies, aqueous solutions for application to mucous membranes, and as the alkaloid for solution in light liquid petrolatum.

MERCK EPHEDRINE IS AVAILABLE IN THE FOLLOWING FORMS:

- **Ephedrine Alkaloid Anhydrous U.S.P.**
- **Ephedrine Alkaloid U.S.P. (Hemihydrate) Water content 5.17%**
- **Ephedrine Hydrochloride U.S.P.**
- **Ephedrine Sulfate U.S.P. Crystals and Powder**

RACEMIC EPHEDRINE IS AVAILABLE AS:

- **Racemic Ephedrine Alkaloid**
- **Racemic Ephedrine Hydrochloride**
- **Racemic Ephedrine Sulfate**

ARMY E NAVY
BACK THE ATTACK WITH WAR BONDS

MERCK & CO., Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

New York, N. Y. • Philadelphia, Pa. • St. Louis, Mo. • Elkton, Va. • Chicago, Ill. • Los Angeles, Cal.

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Men of Mercy...

THESE were great Americans. They are gone... but through you their power is still great. You have some of these portraits in your purse or in your billfold. They hold the power to spread compassion and comfort throughout the world.

There are children to be clothed in Russia... broken spirits to be mended in Greece... prisoners to be cheered and comforted in barbed-wire enclosures.

There are needy neighbors right here at home to be helped—many of them indirect casualties of this war.

There are torpedoed seamen to be warmed and fed on the docks.

There are wounded lying on the plains of China who need medical supplies.

Take some of these bills from your pocket now. Then send as many of them as you can afford on an errand of great mercy... for war relief through the National War Fund.

When you give this month, to your community's war fund, you also give to the National War Fund. You give ONCE for ALL these agencies listed below. Your gift is divided in many ways... in proportion to the need! Some will go to the needy here in your own town. Some will go to relieve distress and sustain the morale of our allies. Some will go to provide the comforts and pleasures of home for our own troops, through the U S O.

Look at the names of the agencies below. You have given to many of them before... small gifts perhaps when your heart was touched. Add up what you gave before... then double it. You cannot give too much. The need is so great.

Give ONCE for ALL these

- U S O
- United Seamen's Service
- War Prisoners Aid
- Belgian War Relief Society
- British War Relief Society
- French Relief Fund
- Friends of Luxembourg
- Greek War Relief Association
- Norwegian Relief
- Polish War Relief
- Queen Wilhelmina Fund
- Russian War Relief
- United China Relief
- United Czechoslovak Relief
- United Yugoslav Relief Fund
- Refugee Relief Trustees
- United States Committee for the Care of European Children

NATIONAL WAR FUND

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October,


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ANOTHER ZIRCON REFRACTORY APPLICATION MAKES GOOD
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The lining is in perfect condition and should continue to withstand these conditions for many more months.
An experienced staff of field engineers, located in centralized parts of the country, is available to you for consultation on your Refractory problems.
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New York City, Dec. 6-11, 1943.
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A Startling
NEW CHART OF INDUSTRY

To be among the first to see a startling new chart of industry—visit the 19th Exposition of Chemical Industries at New York's Madison Square Garden, December 6-11.

Many industries have completely reorganized their methods and equipment to sustain a world-wide war. New industries have been created by the emergency to manufacture substances unheard of before the war. As a summary of current events and a preview of the future, this Exposition deserves the attention of every chemist, engineer and industrial executive in America.

Marvels in the production of new substances by chemical methods only half disclosed so far, with their counterparts in special processing equipment, are still necessarily in part a war secret. Many details that may be revealed, however, including not a few bearing on post-war plans, will form a leading interest at this year's Exposition of Chemical Industries. Important decisions regarding the post-war activities of manufacturers may be made as a result of this Exposition. Much of the information to be disclosed reflects either the creation of new industries and their products, or the conversion of existing plants to new uses—to help win the war now, to help rebuild the world after Victory has been won.

To be among the first to see the startling new chart of industry, visit this year's Chemical Exposition—and bring your associates.

19th EXPOSITION OF CHEMICAL INDUSTRIES

MADISON SQUARE GARDEN • NEW YORK • DEC. 6-11, 1943

Managed by International Exposition Co.

DANGER!

BRITISH OFFICIAL PHOTO

LAND MINES OF TOMORROW

Like a careful soldier probing untried territory before advancing, today's business man must feel his way into *the unknown tomorrow*.

War's many and drastic readjustments on the home front pose many questions, will pose many more. And each question is a potential land mine, primed to blow up in the face of the short-sighted.

Wyandotte experts are old hands at anticipating changes in the field of industrial chemistry. Always in the van of today's developments, they constantly strive for the "feel" of the future and the technological changes it will bring.

Unflagging research in technical laboratories, constant experimentation with new techniques in war or peace . . . such is the background of Wyandotte men, *trained to expedite tomorrow*. Their counsel is yours . . . and they're always on call.

• ***Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.***

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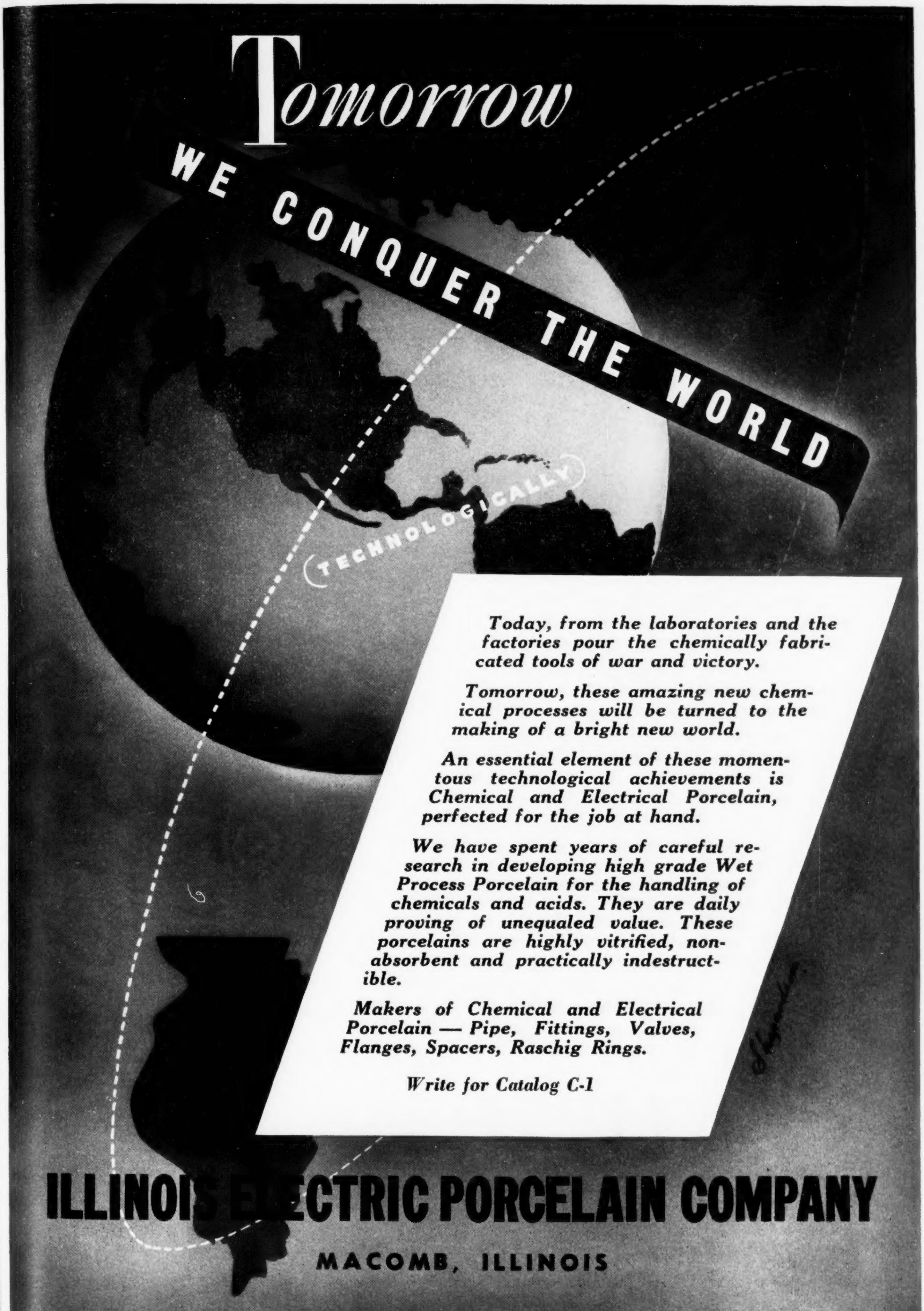
Tomorrow
WE CONQUER THE WORLD
(TECHNOLOGICALLY)
Today, from the laboratories and the factories pour the chemically fabricated tools of war and victory.
Tomorrow, these amazing new chemical processes will be turned to the making of a bright new world.
An essential element of these momentous technological achievements is Chemical and Electrical Porcelain, perfected for the job at hand.
We have spent years of careful research in developing high grade Wet Process Porcelain for the handling of chemicals and acids. They are daily proving of unequaled value. These porcelains are highly vitrified, nonabsorbent and practically indestructible.
Makers of Chemical and Electrical Porcelain — Pipe, Fittings, Valves, Flanges, Spacers, Raschig Rings.
Write for Catalog C-1
ILLINOIS ELECTRIC PORCELAIN COMPANY
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W P B's Middlemen

EDITORIAL

Robert L. Taylor, Editor

Industry will welcome any practical measure that will cut down its government paper work and necessary travel to and from war-jammed Washington. That is the feeling of representatives of the chemical and allied industries that this writer talked to on a trip through portions of the east and middle west shortly after the official announcement on September 21 of the anticipated decentralization move by the War Production Board. This move, it will be recalled, will shift the major part of W.P.B.'s work from Washington to the thirteen regional W.P.B. offices scattered over the country, which through grants of increased authority and autonomy will in effect become thirteen "little W.P.B.'s" according to the announcement.

But while members of the industry would be delighted to toss a few hundred government forms out the window and give nerves frayed by the ordeals of Washington travel and hotel life a chance to mend, there nevertheless seems to be some doubt that the decentralization move will provide the practical remedy for Washingtonitis that it is supposed to—or, perhaps more accurately, there is some fear that the cure may be worse than the disease.

Of course little is yet known about the details of the new system and just how far local autonomy will extend. Since conditions vary so greatly among different materials and products handled by W.P.B., it is probable that division of authority and duties between Washington and regional offices will have to be established individually for each industry division and in some cases even for single products. It is therefore perhaps unjust to pass full judgment on the move until more detailed information is available.

One thing seems certain, however. That is that any real attempt to divide among thirteen individuals located in thirteen different parts of the country the authority to allocate our important war materials and to determine where and how much additional plant expansion should be provided to supply these materials, can result in little better than hopeless confusion if not a serious breakdown of the entire war production machine. It would obviously be an impossibility for the regional office in Texas, for example, to know how much alcohol it is going to have for butadiene manufacturers in a given month and how much for lotion manufacturers without knowing first how much alcohol will be available and how urgent the needs in the Texas area are in comparison with those in the other twelve areas. This information would have to be obtained either through constant conference with representatives of the other twelve offices or through a central control in Washington. Apparently the plan is to retain the overall controls in Washington. But if that is done then the system reverts back to the one we now have except that a large group of middlemen is introduced, and the delay and expense of frequent trips to Washington by some is replaced by the delay and expense to all of working through middlemen.

It may be, however, that as middlemen the regional offices will be able to justify their new importance and responsibilities. There can be no objection to middlemen that serve a useful and economic purpose. But even so, we do not see how the regional offices can be more than middlemen. It seems the best that can be hoped for is that they will be good middlemen and not merely jobholders and makers of red tape. We do not see how they can effectively be given "greater autonomy," as the W.P.B. announcement put it, without resulting in confusion that would be detrimental to the whole war materials distribution set-up.

The Chemicals Division, which is the unit of W.P.B. with which most of us in the chemical industries are best acquainted, has been doing an outstanding job of efficient direction of the output of the vast chemicals producing resources of this country in the service of the nation. That is an opinion which has been expressed by top W.P.B. officials as well as producers and consumers of chemicals. It would be a serious blow to the war effort if the effectiveness of this and other outstandingly successful divisions of W.P.B. are in any way impaired by decentralization of control or indiscriminate establishment of autonomy in regional offices. If the regional offices can serve a useful purpose as middlemen and eliminate some of the paperwork and Washington travel now required of businessmen, well and good. If they attempt to operate literally as "little W.P.B.'s," however, we cannot help but feel that it will be to the detriment—rather than the good of industry and the war effort.

Freshmen Managers: The average age of men in responsible positions in the chemical industries today is probably lower than at any previous time, despite the fact that the manufacture of chemicals during the past thirty years has been pretty much a young man's business.

The vast expansion of production facilities for synthetic rubber, explosives, plastics, aluminum and magnesium, to mention only a few, has resulted in a situation where upgrading of technical men has had to take place at a much more rapid rate than usual in order to provide supervisory staffs for these mushrooming projects. In many cases young men have telescoped ten ordinary years of progress into three or four.

Reports in general are that the youngsters are doing a good job. A vice-president of one large company whose operations have increased seven-fold in the past three years with the result that young men of limited experience have had to be put in charge of many of the new plants, states that there have been relatively few serious blunders on the part of the freshmen managers. What most of these men lack in experience they make up for in common sense, energy and conscientiousness, is the report.

Such evidence as this is a tribute to the young technical men of this country and the educational and social system that produced them. More than that, it presents a most encouraging picture for the future. With men of such calibre moving up in our industries today, there can be little doubt as to the progress in store for peacetime. It is to be hoped that young men of similar qualities will find a foothold and encouragement in the fields of politics and economics.

Bidding Is Dangerous: There are increasing cases of evidence among chemical companies of bidding up the price of technical men. There can be no objection to allowing the law of supply and demand to operate in favor of the technical man just as in depression times it has operated against him along with others, but there are limits beyond which it seems unwise for either employer or employee to go.

In the case of employers, bidding more for one man than he is reasonably worth not only does an injustice to other employees but helps to spread a practice which if it becomes general boomerangs back in the form of an inflated salary scale or loss of other personnel. In the case of employees, acceptance of a new job at a greatly increased salary may mean a temporary advantage but it also may mean loss of security and more often than not will require a deflationary readjustment later on that may be difficult to take or mean actual hardship. Further, technical men cannot do their best work when jumping about from one job to another. It is in the interest of the war effort that they stay put and do what they know how to do and are best able to do.

It is to the interest of management and technical men alike to see to it that bidding up of salaries is stopped.

Required Reading: We made an informal survey among some of our chemical friends a short time ago on the subject of technical reading. The results were rather confusing. Some were doing more reading of the technical literature than they were before the war. About an equal number were doing less. Practically all of those who were doing less gave lack of time as the reason.

Most of us are cramped for time these busy days. Yet this very fact is the main reason we can less afford to neglect our technical reading today than in the days before the war. New jobs and new problems can be dispatched easier and quicker when we have the experience of others on which to build and when we are aware of all of the labor-saving tricks and devices that might apply. In the chemical field, new equipment, new processes, new materials, new ideas, are constantly being presented in the technical literature. Only a few weeks ago we had occasion to talk to an engineer in a chemical equipment company who had been so busy that he had not had a chance to look at the last six issues of this magazine that had been routed over his desk. In the course of our conversation it was discovered that three articles from the six issues had a direct bearing on the project on which he happened to be working at the time. The issues were sent for from the company library. Our friend evidenced interest in the three articles and said he would have to read them. We had hardly got back to our office when we received a call from this engineer saying that he had read the articles and asking if we could send him reprints for his personal reference files.

Technical and trade publications are attempting to pack just as much useful information as possible into their limited number of pages these days. Their primary purpose is to bring to the industries they serve information that will make it possible for those industries and the persons in them to do their war jobs easier and better.

If you feel that you haven't been as consistent a reader of the chemical literature as you should, why not outline a program of required reading for yourself? Set aside an evening a week or a half hour a day for the purpose. And when you read, keep in mind the following words of Francis Bacon: "Read not to contradict and refute, nor to believe and take for granted, nor to find talk and discourse; but to weigh and consider."

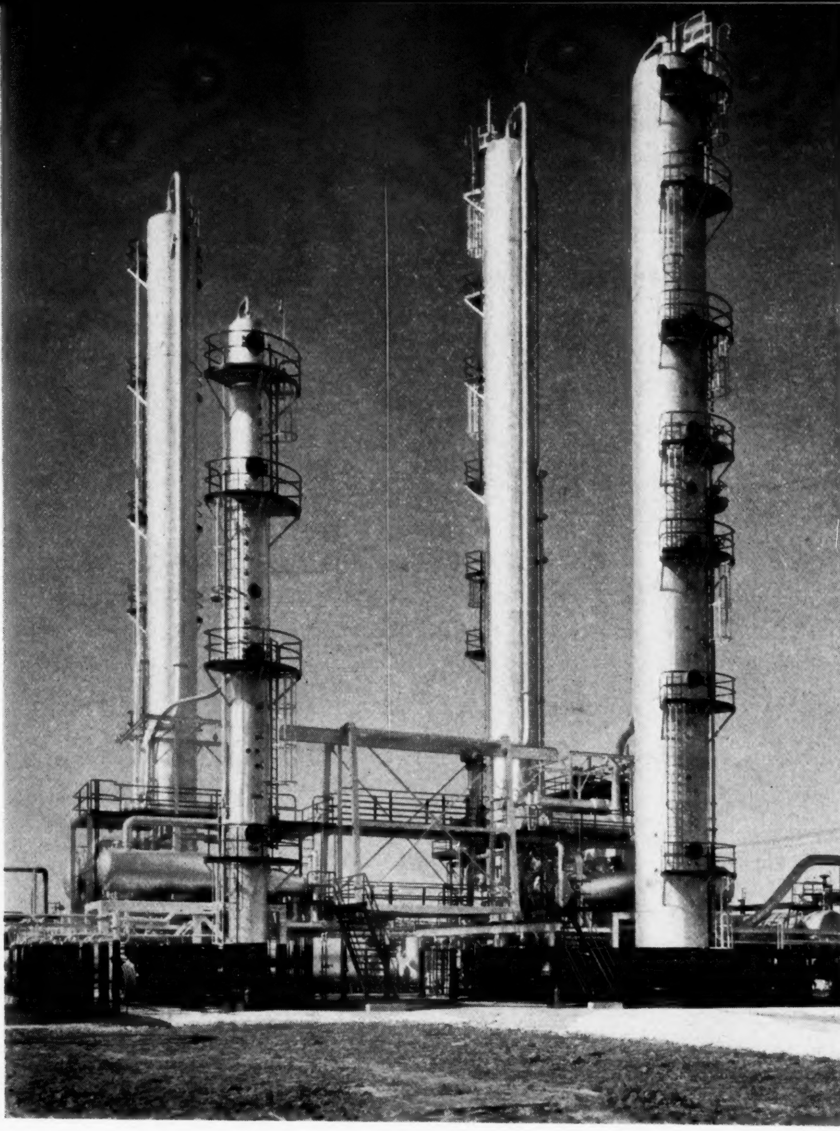


Fig. 1—A new plant on the Gulf coast for making toluene from petroleum.

THE ADVANCING FRONT Of Petroleum Chemicals

By *R. K. Stratford*

Chief Research Chemist, Imperial Oil Limited

Chemicals obtained from petroleum are increasing in both variety and tonnage. Petroleum resins, rubber and plastics may play an important part in post-war reconstruction.

CRUDE petroleum is a great reservoir of organic chemicals. Only recently have the means been available to recover from petroleum the basic compounds which may be the starting points for practically all synthetic organic substances now obtained from other sources. While the variety of synthetic chemicals manufactured on a large scale from petroleum sources is yet small, the petroleum industry has definitely entered the field of chemical manufacture as indicated by the production of a synthetic fuel known as alkylate, to mention only one such development in Canada.

Since crude petroleum consists almost entirely of organic compounds, it is of interest to ask why the petroleum industry did not enter the field of synthetic organic chemicals many years ago. Petroleum chemists have long known the chemical characteristics of the compounds in petroleum, consequently it is necessary to look for other reasons than lack of chemical knowledge to provide an answer.

In the first place, the petroleum industry has grown very rapidly during the past forty years and has spent its energy on increasing the volume and the quality of petroleum fuels, lubricants and related products. Second, the number and complexity of the hydrocarbons in petroleum has made the separation of single pure compounds an exceedingly difficult task. Until a few years ago, it was impossible to separate by fractional distillation even the lighter petroleum compounds with anything like the purity necessary for the manufacture of synthetic chemicals. Third, "cracking" processes by which large complex molecules are broken into simpler and more suitable ones have only recently been improved to produce a maximum amount of desired basic petroleum chem-

The Chemical Importance of Petroleum

The following was originally included by Dr. Stratford in his manuscript of the article beginning on the preceding page. It has been set apart in this fashion, however, because the editors of CHEMICAL INDUSTRIES *feel it is something that will be of special interest to all who are engaged in the production of organic chemicals—synthetic or natural—or who contemplate such production.*—EDITOR.

PETROLEUM is by far the most attractive source for large scale production of many synthetic organic chemicals.

Present developments in the manufacture of synthetic chemicals from petroleum and the potentialities of much greater future developments have important implications for many industries. From the viewpoint of the petroleum industry it may well be its coming of age. Crude petroleum, regardless of its source, would be the raw material for the manufacture of a host of synthetic chemicals as well as uniform high quality fuels and lubricants. Assuming the existence of a market for large quantities of synthetic chemicals, their production would make it possible to obtain more value from each barrel of crude. In other words, a relatively low cost material could be transformed into high-value, high-quality products.

Since the petroleum industry has always operated to produce large volumes of products, its operation can only be affected if large quantities of organic chemicals are required. If the petroleum industry does produce large quantities of chemicals, it will be a serious competitor to the other sources of these chemicals. The petroleum industry's basic organic compounds as well as dyes, drugs and explosives would compete with those of the coal tar and similar industries, its synthetic rubber with natural rubber, and its plastics with light metals and plywood. The economic implications of these possibilities require that careful consideration be given now to the potential chemical markets and the effect of large scale production of chemicals from petroleum on existing chemical industries. Such considerations should take into account the undoubtedly expanding requirements for synthetic chemicals and, in particular, the effect of research in developing new uses for these chemicals.

The petroleum industry has already entered the field of chemical manufacture. The basic chemical knowledge is available for a much greater advance into this field. Despite the problems and dangers entailed in such an advance the economic and industrial value of chemicals from petroleum should not be lost or wasted. The problems on the manner and extent to which the petroleum industry should enter the chemical manufacturing field are too great for solution by a single industry, too important for hasty solutions, and too involved for other than careful dependence on scientific principles.

Whether industry as a whole should be asked to plan for the future on a nation wide scale is a moot question. One possibility is cooperative planning and research by industrial, university and government scientists on methods of safely absorbing the new products which are bound to flood world markets once war demands cease. Only by forethought now will the chemical importance of petroleum be fully and safely realized in the world of readjustments after the war.—R. K. STRATFORD.

icals. Fourth, new processes now make it possible to produce on a large scale ring-shaped benzene and similar molecules from straight chain paraffinic molecules. Fifth, a still later development has been the use of solvent extraction in the separation of compounds from petroleum and their concentration to the necessary purity.

Chiefly for these reasons the entrance of the petroleum industry into the field of synthetic organic chemicals has been delayed until very recent years.

It is well known that the petroleum industry is putting its greatest effort into the production of fuels and lubricants for the United Nations war effort. It is not this important phase of the petroleum industry which is under consideration here, but the production of pure chemicals which it has already been found practical to manufacture from petroleum hydrocarbons.

The Petroleum Hydrocarbons

Two types of basic hydrocarbons are obtained from petroleum for manufacture into more complex organic substances.

1. Aliphatic hydrocarbons which are manufactured from the gaseous mono-olefins.
2. Aromatic hydrocarbons which are manufactured and separated from liquid petroleum fractions.

Basic Aliphatic Hydrocarbons

The aliphatic hydrocarbons may be made in two ways: First, by destructively cracking petroleum at high temperatures in the presence of air to produce a mixture of oxygen-containing compounds such as methyl alcohol, ethyl alcohol, formaldehyde, acetaldehyde, acetic acid, etc. The desired basic chemicals must then be separated from the resultant mixture and purified by various chemical and physical means. Second, by cracking petroleum in the absence of air, whence a mixture of mono-olefins (and other hydrocarbons) are formed, which after separation and purification can be oxidized, chlorinated, nitrated, polymerized, etc. to give the desired basic chemicals. The manufacture of basic organic chemicals by this second procedure is the concern of this article.

The starting point in the manufacture of chemicals from petroleum is at the crude petroleum fractional distillation towers where the crude oil is distilled into component fractions. The intermediate and heavy fractions from the towers form the feed stock to cracking coils where at predetermined temperatures and pressures the petroleum fractions are cracked or broken down into simpler hydrocarbons.

Modern cracking procedures now permit operations under:

1. Low temperature, low pressure, long-time conditions.
2. High temperature, low pressure, short-time conditions.
3. High temperature, high pressure, short-time conditions.
4. Use of a catalyst to increase the production of desired hydrocarbons.

Temperatures as high as 1400° F. have been reached under low pressure conditions while pressures as high as 1000 pounds per square inch have been used at temperatures of the order of 900° F. for the more moderate type of cracking. The

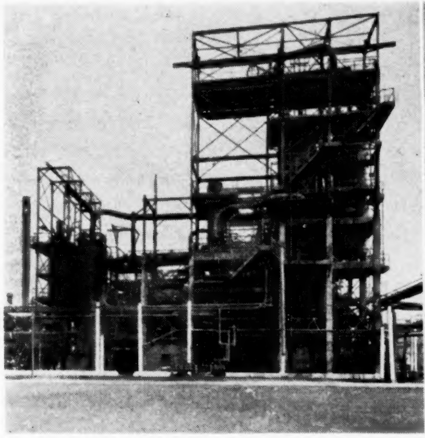


Fig. 2—Super-suspensoid cracking plant—a modern catalytic type.

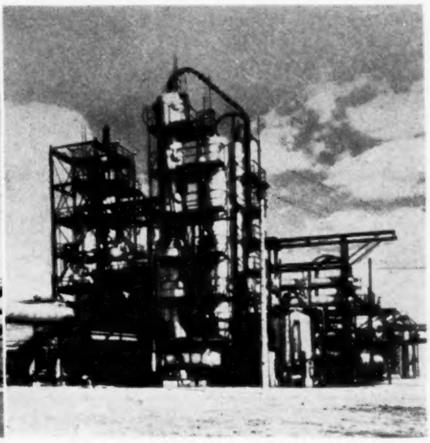


Fig. 3—Plant for separating gaseous from liquid hydrocarbons.

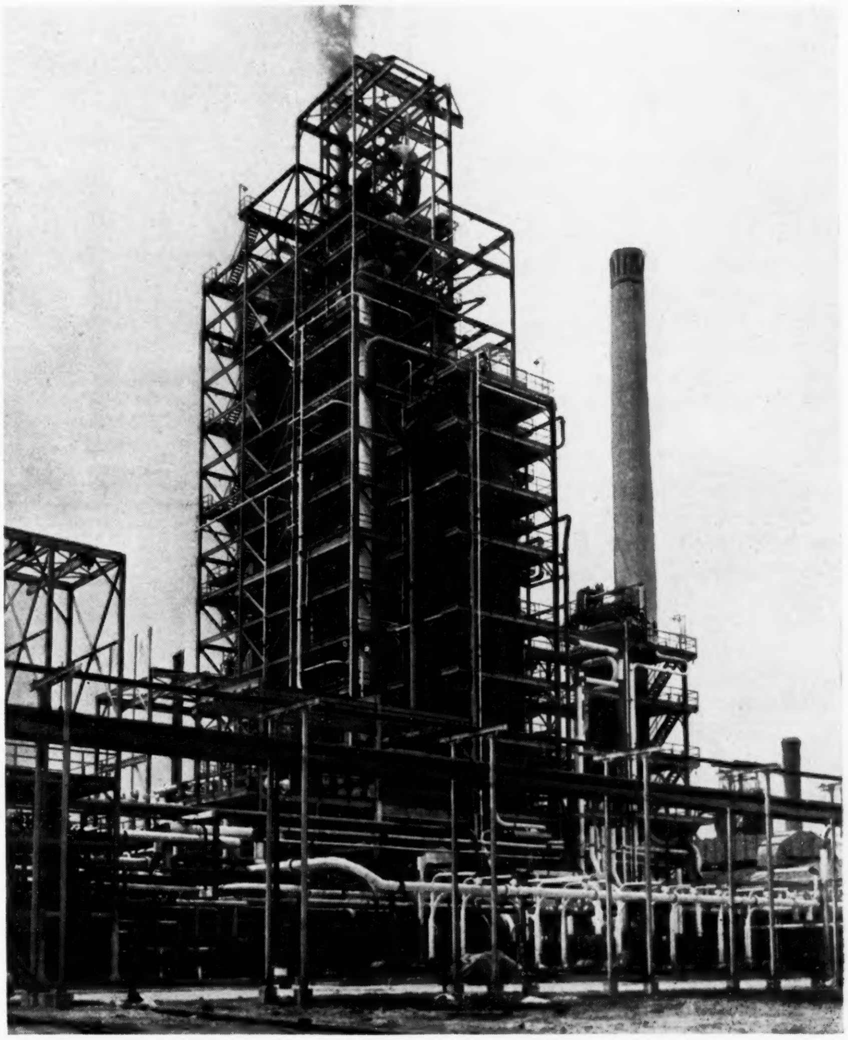


Fig. 4—A fluid catalyst cracking unit, commonly known as a "cat" cracker. This is the first of thirty such units put up recently throughout the U. S.

variety of cracking operations makes possible the selection of a procedure most suitable for the desired results. Since the mono-olefins required for further processing into organic chemicals are produced by cracking, it is desirable to utilize for this purpose the cracking operation which produces the maximum practical amount of these gaseous hydrocarbons.

Two types of modern catalytic cracking plants designed to produce among other things a maximum amount of hydrocarbon gases are the super-suspensoid cracking plant and the fluid catalyst cracking plant, examples of which are shown in Figures 2 and 4.

Cracking

Cracking plants produce the desired mono-olefins mixed with other gaseous and liquid products of cracking. The gases are first separated from the liquids. This is done by simply venting the gases from the liquid and by fractional distillation in a plant, one type of which is shown in Figure 3. The separated gaseous fraction consisting of some ten different gases including the desired mono-olefins is compressed and refrigerated to the liquid state and delivered to a series of highly efficient fractional distillation towers. Here the separation of individual gases begins. Methane and hydrogen are separated first and then ethylene. Ethane is next removed, followed by propylene and propane which are removed together. Finally isobutane, isobutylene, butylene and butane, the gaseous hydrocarbons containing four carbon atoms, are removed together as a fraction called the "Butane Cut."

More complete separation of the gases cannot be accomplished by commercial fractional distillation since a difference of about 20° F. is required between the boiling points of the components to be separated. The difficulty is apparent from the differences in the boiling points of the gaseous hydrocarbons as shown in the following table:

Boiling Points of Gaseous Petroleum Hydrocarbons

Hydrocarbon	*Normal Boiling Point °F.*	*Difference °F.*
Methane	—258	
		103
Ethylene	—155	
		27
Ethane	—128	
		74
Propylene	—54	
		10
Propane	—44	
		54
Iso-butane	+10	
		9
Isobutylene	+19	
		1
Butylene	+20	
		11
Butane	+31	

While ethylene and ethane boil sufficiently far apart to be separated by fractional distillation, it is not practical to separate propylene and propane which differ by only 10° F. in their boiling points. The small differences between the boiling points of the components of the butane cut also prevent their separation by fractional distillation. Consequently it has been necessary to develop solvent extraction methods to separate mono-olefins from the other gases. It is well known that 90-94% sulfuric acid at moderate temperatures extracts propylene from propane, that 80-90% sulfuric acid extracts butylene and 60-70% sulfuric acid extracts iso-butylene from the butane cut. There are other methods used for the extraction of hydrocarbons, but due to present circumstances, these cannot be discussed.

Figure 5 shows a typical solvent extraction plant which chemically extracts pure hydrocarbons suitable for the manufacture of synthetic organic chemicals. In plants similar to that shown, iso-butylene and butylene can be separated not only from butane and iso-butane, but

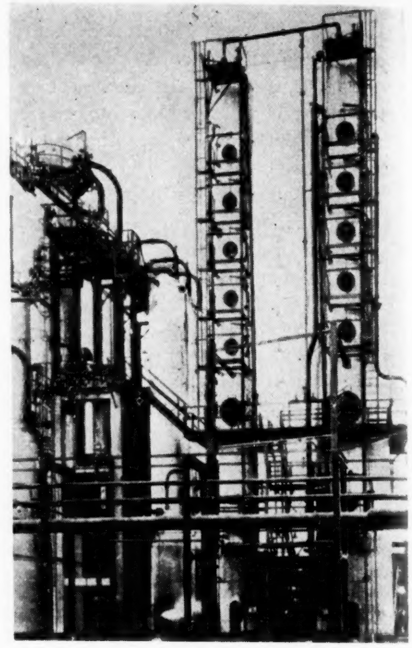
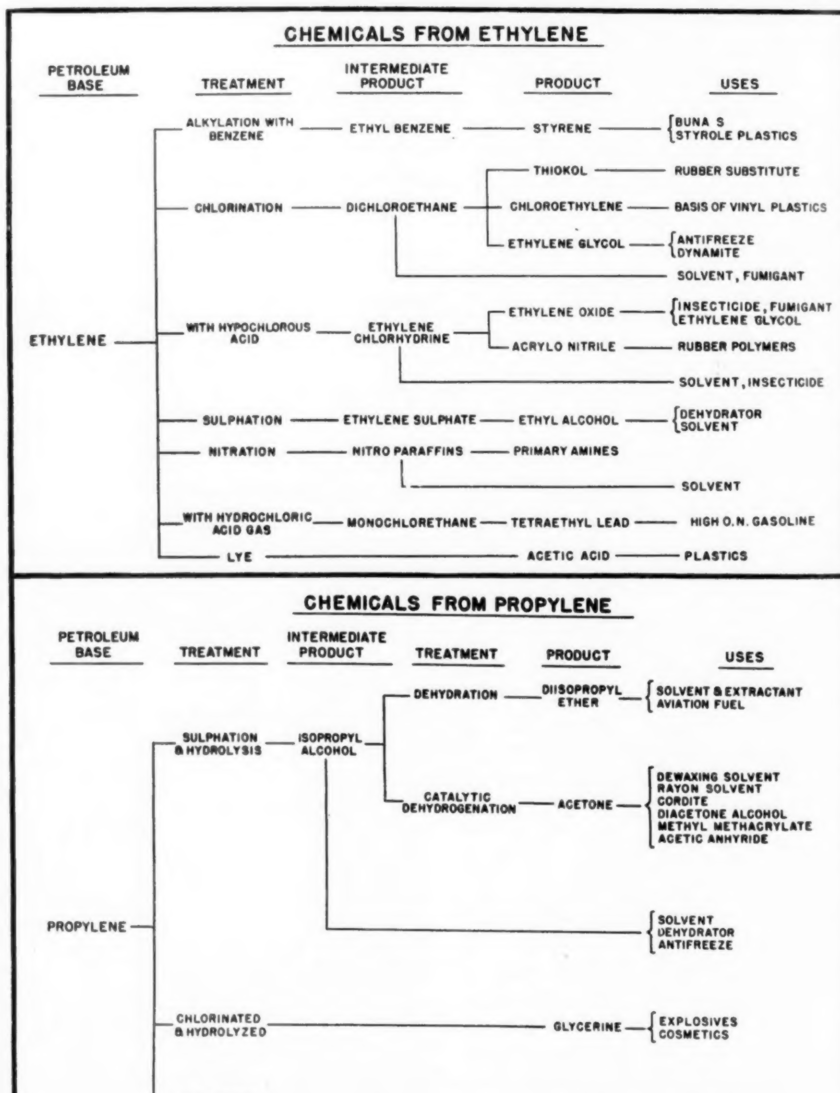


Fig. 5—Solvent extraction plant.

Charts I and II



from one another to a suitable degree of purity.

Basic Aromatic Hydrocarbons

One of the fractions from crude petroleum contains most of the aromatic hydrocarbons such as benzene, toluene and xylene. It also contains straight chain paraffinic hydrocarbons that can be looped into the characterizing ring of the aromatic hydrocarbons. The conversion of potential into actual aromatics takes place when the heated fraction is passed with hydrogen over a catalyst. In this way the aromatic content of the fraction is greatly increased. Extraction processes then separate the aromatics from the rest of the fraction.

Aromatics have long been the starting substances in the synthesis of organic chemicals, the presence of which in coal tar makes this substance a prolific source of organic chemicals. While the amount of aromatics obtainable from coal amounts to less than 1% of the coal, a yield of aromatics as high as 7 to 10% may be obtained from crude petroleum. The Nobel brothers in 1877 in Russia first investigated the production of aromatics from petroleum. During the last war, Hall in England and Rittman in America developed methods of manufacturing aromatics, particularly toluene, from petroleum. Toluene is used in the manufacture of the high explosive, trinitro-toluene (T. N. T.). It is reported that 25 million gallons of toluene for this purpose is made annually in the United States from coal tar. Published reports indicate that 250 to 300 million gallons of toluene will be required each year during the war. It is understood that most of this will be produced from petroleum by the petroleum industry. Figure 1 shows a new toluene plant on the Gulf coast.

Organic Chemicals from Basic Hydrocarbons

It is well known that methane can be reduced to carbon monoxide and hydrogen, which can then be recombined to form methyl alcohol. By further oxidation methyl alcohol can be converted into formaldehyde, an important component of the phenol-formaldehyde type of plastics. While sufficient methane could be obtained from refinery gases for the manufacture of a large quantity of formaldehyde, a more probable source is natural gas. This occurs in great quantities in many parts of the country and consists for the most part of methane.

The potential number of chemicals using ethylene as a basic substance amounts to many thousands. A few of the more important chemicals that can be made in large quantities are shown in Chart I. By such processes as alkylation, chlorination, sulfonation, and nitration, ethylene is converted into organic chemicals such as styrene, ethylene glycol, ethyl alcohol and acetic acid. Many of the products so formed are used in the manufacture of synthetic resins, rubber and plastics.

Chart II shows a few of the organic substances that can be made from propylene. By essentially the same methods as are used for ethylene, propylene may be converted to such products as acetone, glycerine, cumene, and others, which are used in a variety of materials ranging from cosmetics to explosives.

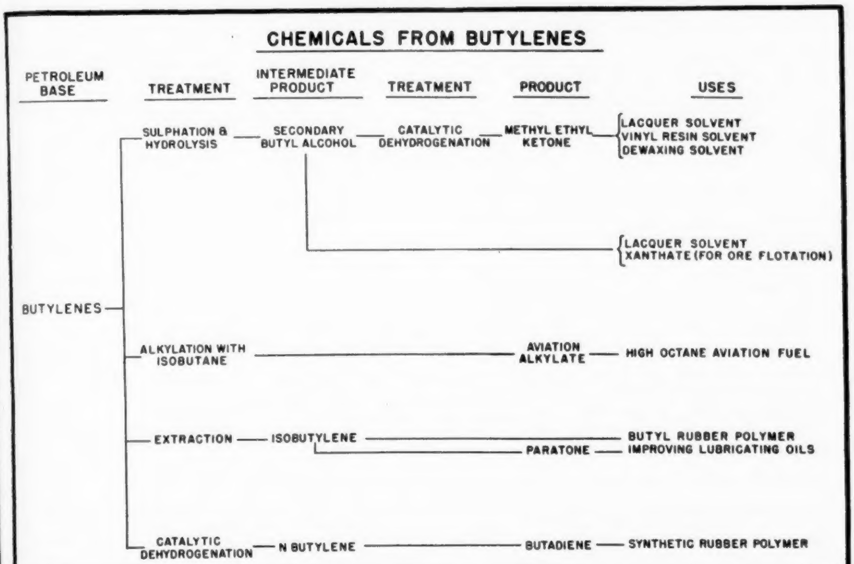
For several years the butylenes have been used in the manufacture of aviation alkylate, the synthetic fuel added to aviation gasolines to increase their octane number. The chief component of aviation alkylate is iso-octane, a hydrocarbon which only a few years ago cost $25.00 a gallon. As an indication of the economic significance of large scale production of chemicals from petroleum, the cost of iso-octane today is less than 50 cents a gallon.

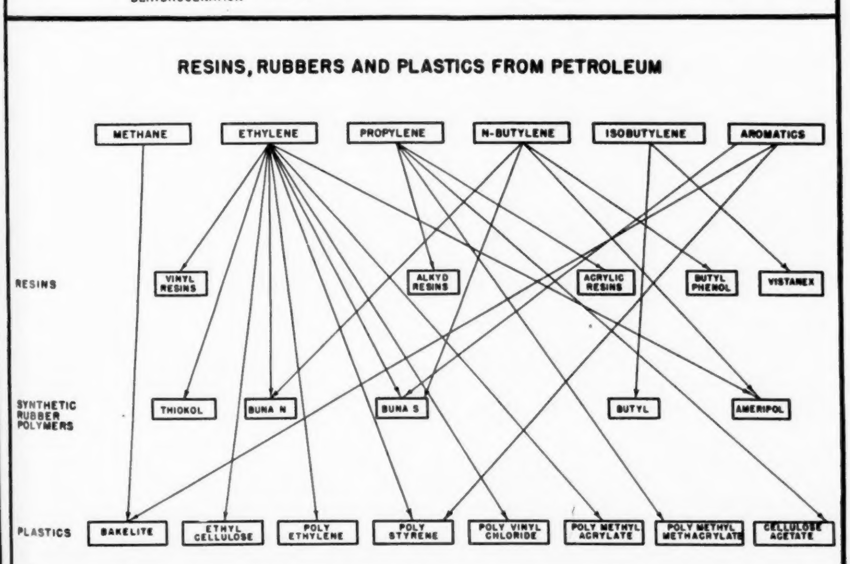
Until the Japanese took control of this continent's chief sources of natural rubber, butylenes were used as a component of motor gasoline and in the manufacture of iso-octane and butyl alcohols. Now they are the chief source of synthetic rubbers. Buna S synthetic rubber requires butylene as a basic raw material while Butyl synthetic rubber utilizes isobutylene.

Chart III shows some of the products which are now obtained from the butylenes.

Chart IV emphasizes the rapid increase in the importance of the few petroleum hydrocarbons discussed here in the production of synthetic resins, rubbers and plastics. These are by no means all the types of such organic substances utilizing simple hydrocarbons as a starting point, since many of the recent developments in this field have not been published in the literature. As certainly as knowledge in this field increases, so will the variety and quality of synthetic resins, rubbers and plastics be augmented. These materials may play a very important part in the after-war reconstruction program.

Charts III and IV





War "Plants" Record Progress

An Editorial Staff Report of the 4th Mid-American Chemurgic Conference

There has been a big expansion in nature's as well as industry's chemical plants, to meet the production requirements of victory. Plants—the leafy variety—are providing important raw materials for war industry—some new and some old.

FARM products are playing a varied and collectively large role in the industrial war production program of the nation, over and above the obvious of providing full dinner pails for those who make the ships, planes and guns.

In this war, to a far greater extent than the last, farms are providing actual tools of combat—rubber, explosives, plastics, paints, are some of the best known. Others not so well known include rare drugs formerly imported, milkweed fiber for life jackets, flax straw for cigarette paper formerly 99 per cent imported from France, essential oils, spices, and pyrethrum flowers.

These and similar subjects are what was talked about by the 150 industrialists, scientists and farmers who attended the Fourth Mid-American Chemurgic Conference at Cincinnati, September 29 and 30.

As was expected, the alcohol program came in for considerable discussion, especially in view of the sudden increase in demand a few weeks ago which resulted in cancellation of the promised two weeks "vacation" for grain distillers during which they were to be allowed to produce for beverage use. Dr. A. J. Liebmann, president of the Schenley Research Institute, in his paper "Alcohol for War Purposes" presented data made available by the Alcohol Tax Unit of the Treasury Department showing the trend in production of alcohol from various raw materials since 1936. These data are reproduced in the table on this page.

Alcohol Outlook

Asking the question, "What is the outlook for the future?" Dr. Liebmann said, "We know that the demands for alcohol for the present year and at least the next year will probably be in excess of past and present requirements. Only a sudden cessation of hostilities can change this situation, and the preponderance of sober opinion is still that Summer or Fall of 1944—at least for Europe—would be a hopeful probability. Most of this demand, probably half of the entire production, is for the synthetic rubber industry. We know now that probably two-thirds of the needed butadiene and styrene will have to come from alcohol. The smokeless powder plants will continue to use alcohol at least at their present rate. Our allies must be supplied.

"Therefore, the nation's beverage distillers, grain distillers, will be called upon this year to produce 230 to 250 million gallons of alcohol. As to the present stocks of alcohol, there were available at the end of July 138 million gallons of which approximately 38 million gallons were rotating stock.

"Much loose talk and comment has been created by this seemingly enormous reserve stock. It should be kept in mind that the alcohol industry probably was able to reach its peak production before the butadiene and styrene plants were fully constructed or reached peak capacity. As soon as all plants now in construction will be completed, and will call with those already operating, for their full quota of alcohol, it is most likely that the current rate of production will fall considerably short of consumption, so that the stockpile will be called upon for the purpose it was created, and will be gradually reduced. Just now it looks like a very nice insurance.

"The increasing scarcity of grain has recently brought another and much discussed source for alcohol to renewed attention—that of waste wood and sulfite liquors from the paper industry. There are plants for recovery of these by-products now in operation in this country and in Canada, so that it will be possible to study the details of this process. We know, however, that it requires very large quantities of critical materials, much larger in proportion to output, than other processes. It seems most unlikely that this source will enter into the picture to a noticeable degree in the near future, nor are its general prospects too encouraging.

"As chemurgists we are of course also interested in other farm products which may serve as raw materials for alcohol: beets, potatoes, Jerusalem artichokes. They may all have their local possibilities and limited uses. They cannot fundamentally enter into serious consideration to a large degree. Considering potatoes for just a minute, it should be pointed out that their moisture content averages about 65-70 per cent. With the transportation problem already grave, it appears hardly practical to transport two-thirds of useless water around the country.

"For all practical purposes grain and molasses will undoubtedly continue to be our main sources of supply of alcohol."

Future of Fermentation

That 2, 3-butylene glycol will be the outstanding product development from fermentation in this war as butyl alcohol was in the last was predicted by Dr. Paul Kolachov, technical counselor for Joseph E. Seagrams & Sons, in his paper "Chemurgic Raw Materials for the Fermentation Industry." The fermentation industry shows unusual possibilities chiefly for two reasons, Dr. Kolachov said.

Production of Ethyl Alcohol, 1936-1943

A. Production in Million Gallons (fiscal years)

	1936	1937	1940	1941	1942	1943*
Grain	8.2	16.8	16.5	22.5	60.0	232.5
Molasses	78.5	88.8	88.0	109.5	152.2	84.9
Synthetic	17.4	18.9	32.9	37.2	48.1	52.7
Import	0.0	0.0	0.0	0.0	0.0	4.9
Total	104.1	124.5	137.4	169.2	260.3	375.0

B. Production in Per Cent

	1936	1937	1940	1941	1942	1943*
Grain	7.9	13.5	12.0	13.3	23.0	62.0
Molasses	75.4	71.3	64.0	64.7	58,5	22.6
Synthetic	16.7	15.2	24.0	22.0	18.5	14.1
Import	0.0	0.0	0.0	0.0	0.0	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

* Preliminary—based on first six months production.
Data from Alcohol Tax Unit, Treasury Department.

1) Many different compounds can be oduced: alcohol, butylene glycol, acids, n-nitrogenous organic compounds.) It draws its raw materials from an exhaustible source."

Dr. Kolachov urged "intensive farming increase crop yield and starch content the chemurgic movement is to survive." e said the fermentation industry is al- dy working on soil conservation and t this long range program along with ore plentiful labor, machinery and fer- izer after the war should mean that the ture will see a rise in the development the industry. He gave the following mparative data on raw materials:

	Average yield of 95 per cent Alcohol in proof gallons per 100 lbs.	per acre
rn	4.5	130
heat	4.0	33
e	4.0	35
sh potatoes	1.2	175
eet potatoes	1.7	142
gar beets	1.2	299
rusalem artichokes	1.3	250
olasses	.42*	100

* Gal. alcohol per gal. molasses.

	Average yield of Butylene Glycol lbs. per bu.	lbs. per acre
rn	13.0	676.0
ied sweet potato meal	11.6	765.6

Speaking of the future, John W. Tick- r, assistant to the president of the Na- onal Farm Chemurgic Council, said that e Council "strongly advocates the grow- g of crops to specifications. As an ex- nple, cotton, soybeans, castor beans and her crops are being cultivated to meet ecific demands made by industry. In her words, we are organizing markets r crops before the planting begins." He id that efforts for domestic production pyrethrum, rotenone and similar crops ntinue. "Essential oils, spices, and vor plants used in foods and medicines dicate a possible new market for crops om thousands of American acres," he dded.

Dr. George M. Hocking of S. B. enick and Co. in a talk describing American cultivation of crude drugs said that domestic belladonna plants compared favorably with the imported in alkaloid content but that we will undoubtedly go back to the imported after the war be- cause of the higher cost of harvest labor in this country.

Camouflage Paints

Discussing camouflage and blackout paints, M. F. Taggart, director of re- search of the O'Brien Varnish Co., said that for such materials chemists must pay attention to the photographic aspects of their products as well as ordinary ap- pearances. An example of two identical- appearing paints having different infra- red reflection characteristics is shown on this page. Chromium hydroxide base greens show high infra-red reflectance, he said, whereas a mixture of lampblack, iron oxide and iron hydroxide shows a very low infra-red reflectance even though by careful formulation the two can be made to look exactly alike to the eye and ordinary camera film.

"Blackout paints are formulated to be without gloss, dead-flat, to eliminate highlights from star shells and have the pigmentation so selected and dispersed as to be free from pin-holes, often un- noticed in ordinary paints. Both per- manent and temporary water-soluble types are required."

Defatted Grain Germs

Preservation of wheat germ and corn germ for food purposes by low tempera- ture defatting was described by Ezra Levin, president of the VioBin Corpora- tion. These parts of the grain are extremely rich in vitamins and minerals, he said, but are normally removed and discarded in the milling operation because they contain oils which easily become ran- cid. Defatting removes these oils. Pres- ent uses of defatted wheat germ are in baby cereals, baby soups, bread, macaroni products, adult cereals, dry mixture drinks, meat substitutes, and pharmaceu- tical products, Mr. Levin said.

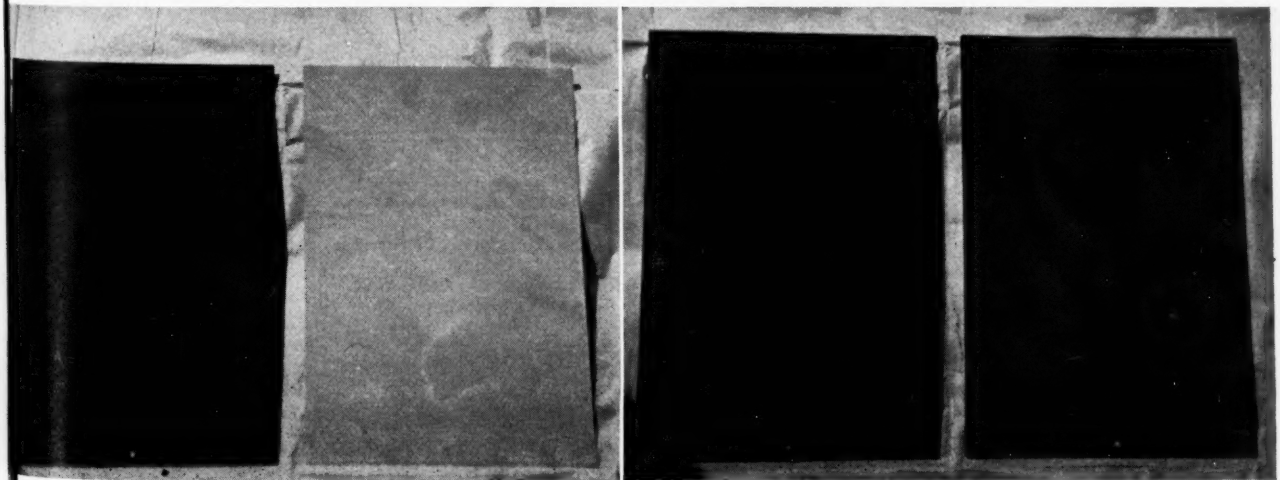
"I estimated that we could get more than 65 million pounds of defatted wheat germ a year. A pound of defatted wheat germ represents 15 daily portions of 30 grams each, which will provide the total B-1 requirement, one-sixth the total pro- tein requirement, one-third the iron re- quirement, two-fifths the phosphorus re- quirement of a child.

"Thus we have about one billion daily portions, or a yearly supply for more than 2½ million children . . . a perfectly stable food concentrate that Nature has produced in the embryo of wheat—a prod- uct that can be stored indefinitely, that could be manufactured now, for use after the war, to aid in prevention of the famine and pestilence that awaits many of the world's children."

Articles based on two of the papers presented at the meeting, "Plastic Fillers," by W. C. Gangloff, The Drackett Co., and "Printing Inks from a Chemurgic Angle," by F. E. Petke and C. H. Allen, Hilton-Davis Co., are presented elsewhere in this issue of CHEMICAL INDUSTRIES.

Other papers comprising the two-day program were: "Insecticides from Farm Crops," by J. Edmund Good, Woburn De- greasing Co.; "Chemurgic Previews," by F. C. Atwood, Atlantic Research Asso- ciates, Inc.; "Homes of the Future," by C. F. Boester, Purdue Research Founda- tion: "Plastics from Farm and Potato Starch Plant Wastes," by R. E. Gale, Idaho Power Co.; "Corn and Wheat Em- bryo," by Ezra Lebin, Vio Bin Corp.; "Rubber from Soybeans," by A. J. Sny- der, Reichhold Chemicals, Inc.; "Postwar Jobs" by B. L. West, Cussins and Fearn Co.; "Increasing the Fruitfulness of Hor- ticultural Crops," by F. S. Howlett, Ohio Agricultural Experiment Station; and "Plastics in the Metal Industry," by An- son Hayes and G. R. Hoover, American Rolling Mill Co.

hese two photos are of the same pair of panels. The one on the left was taken with film sensitive to infra-red rays, e one on the right with ordinary film. Although the two panels look the same, their infra-red characteristics differ.



WAX SUBSTITUTES

By *Charles S. Glickman,* Consultant on Synthetic Waxes

With the increasing scarcity of natural waxes, more and more users are turning to synthetics entirely or to blends of natural and synthetic materials. The preparation and characteristics of some of the more important synthetics are described here along with suggestions for their use alone and in blends.

INTEREST in wax substitutes has been growing rapidly since the summer of 1942. While the research efforts of certain technical organizations as well as individual investigators in this field antedates this latter period, latest reports still indicate that no perfect substitute or replacement for all-important carnauba has yet been found. It is our intention to present herewith in concise form the general technical methods available for the preparation of various types of wax substitutes and/or replacements. To further clarify the two latter expressions, let us define *substitutes* as those compounds which may be directly utilized in lieu of the original compound (wax) without requiring any modification of the formulation or procedure in order to obtain an equivalent finished commercial product. *Replacements* may be defined as materials which may be used in place of the original wax but which require some modification in formulation and/or processing to achieve results equal to those obtained with the natural product.

One of the major difficulties that wax researchers have encountered in the past has been the lack of a uniform method for technically evaluating the products they have created. The writer has developed such a method—a method which has proved its value in the study of synthetic waxes. The application of this method will be demonstrated with reference to the production and testing of carnauba substitutes.

The several methods which form the spearhead of the attack on the problem of wax substitutes and replacements may be divided into two broad classes—*chemical syntheses* and *compounding* (blending). Under syntheses we may list the following:

1. Friedel-Crafts reactions and Grignard reactions.
2. Oxidation reactions.
3. Chlorination reactions.
4. Hydrogenation reactions.
5. Esterification reactions.

Under compounding there are the following possibilities:

1. Mixtures of natural waxes.
2. Mixtures of natural waxes and natural resins.
3. Mixtures of natural waxes and synthetic resins.
4. Mixtures of natural waxes and cellulose ethers.

There still exists a third and final possibility which does not fall within either of the two general preceding methods. That is the formation of highly complex physico-chemical aggregates which exhibit unusual and valuable waxlike properties because of their heterogeneous colloidal structure. These compounds derive from the interreaction of natural waxes and organo-metallic compounds under certain prescribed conditions.

The Friedel-Crafts and Grignard reactions are utilized in the production of alkyl-aryl ketones of high molecular weight. Ralston and Christensen[1] describe the preparation of a wide variety of compounds ranging in melting point from 46° C. to as high as 177°C. These products have the general structure $R\text{-}\underset{\underset{O}{\|}}{C}\text{-}R'$ where R is an aryl and R′ an alkyl radical. Using phenoxyphenylmagnesium bromide and lauronitrile in a Grignard reaction, phenoxyphenylundecyl ketone with an M.P. of 46° C. is produced. By means of the Friedel-Crafts reaction, diphenyl ether and stearyl chloride result in the production of phenoxyphenyl heptadecyl ketone with an M.P. of 68° C. A lustrous wax with an M.P. of 83-4° C. is produced by the interreaction of dibenzofuran and stearyl chloride. Diphenyl tridecyl ketone with an M.P. of 102-3° C. is prepared from diphenyl and palmityl chloride. Still another wax with an M.P. of 108-9° C. is prepared from diphenyl and stearyl chloride. Representative of the extremely high melting point compounds which may be prepared by means of either of the two aforementioned reactions is 2, 8 distearylcarbazole which has an M.P. of 161-2° C. The wax with the highest melting point described by the authors is prepared by means of the Friedel-Crafts reaction using *p*-nitrodiphenyl ether and stearyl chloride and resulting in the formation of *p*-nitrophenoxyphenyl heptadecyl ketone with an M.P. of 177-8° C. Data by the authors on one of the waxes prepared indicate excellent solubility in benzene, toluene, carbon tetrachloride, chloroform, kerosene and turpentine.

Oxidation reactions are applicable to the treatment of paraffins or petroleum waxes, montan waxes, etc. Acids or high molecular weight alcohols may be produced depending upon the reaction conditions and the catalysts. Where alcohols are produced they may be reacted with fatty acids such as stearic to pro-

Demand for wax substitutes and replacements used in chemical specialties such as furniture polish has been greatly increased this year.

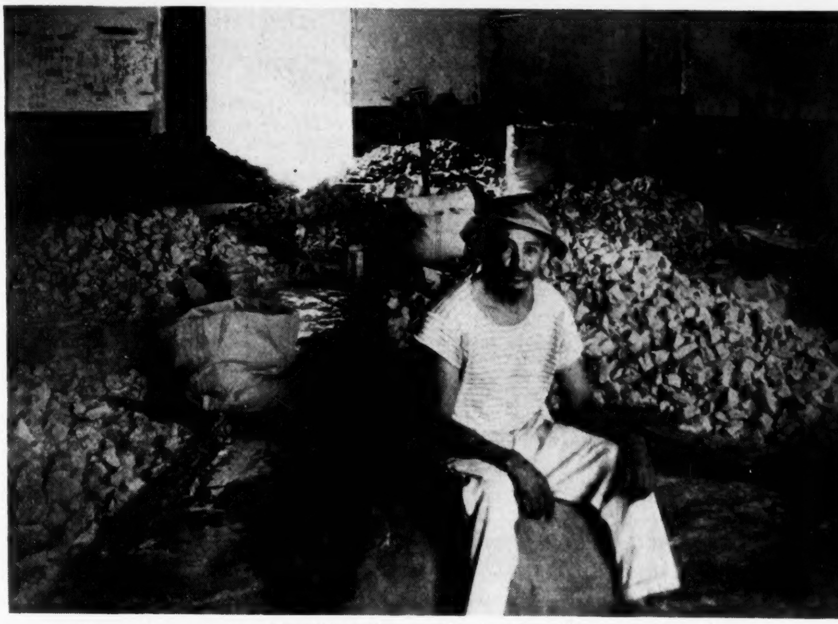
duce true synthetic waxes of excellent properties. Likewise where acids are produced they may be esterified with polyhydric alcohols to give waxy esters. Ellis[2] states that if the oxidation is carefully controlled, products resembling true waxes are obtained. When paraffin is oxidized with air at 135-145° C. according to Holde[3] acid anhydrides are formed which may be esterified with appropriate alcohols. Using a hard paraffin wax and oxidizing with air at 100-200° C. for 2-3 hours in the presence of boric anhydride (5% based on the weight of wax) and acetic acid vapor (1.6 gms. per cubic meter of air) a light colored product containing about 44% of alcohols is obtained.[4]

A beeswax substitute is produced by oxidizing paraffin with air at 150° C. and separating the products. A synthetic waxy product with an M.P. of 52° C., an acid value of 21, a saponification value of 75.6 and an iodine value of 4.7 is obtained.[5] Similarly, valuable oxidation products may be secured by the treatment of montan wax with oxygen or the oxidation of mixtures of paraffin wax, resins and castor oil in the presence of catalysts.[6]

The best known of the chlorinated compounds resembling waxes are the Halowaxes (Bakelite Corp.) which are prepared by the chlorination of naphthalene. U. S. Patent No. 2,069,183 describes the process. These products have a chlorine content of 59-62%. an M.P. of 115-138° C. and a Sp. G. of 1.49/150° C. They are chemically inert and valuable for their resistance properties against acids and alkalies. They are readily soluble in the common hydrocarbon solvents and range in color from white to pale yellow. They blend well with other waxes.

A further example of the use of chlorination is the treatment of montan wax in the presence of a strong base such as sodium or calcium hydroxides with chlorine to produce a beeswax substitute. The chlorination of diphenyl under the proper conditions results in a series of interesting compounds ranging in chlorine content from approximately 19-71%. These products are commercially available as the Aroclors (Monsanto Chemical Co.) and form suitable blending and compounding agents with waxes such as paraffin. If 96 parts by weight of Aroclor 5460 and 4 parts of paraffin (54° C.) are mixed, a compound with an M.P. of 82° C is produced. If Aroclor 4465 is used a mixture of 58° C. M.P. is created. These mixtures are soluble in the usual solvents.

Hydrogenation is a valuable tool in the preparation of synthetic waxes. The writer has had occasion to review the basic methods, catalysts, processing conditions as well as certain derivatives arising out of the selective hydrogenation of montan wax.[7] The natural oils when



Carnauba wax is classified by grade in Brazilian sorting houses.

completely hydrogenated yield interesting products with M.P.'s ranging from as low as 43-45° C. in the case of coconut oil up to 86-90° C. when castor oil is used. The latter product in one commercial form is stated as having an M.P. of 87° C., a free fatty acid content of 3%, an iodine value of 3 and a saponification number of 180. Hydrogenated fish oils produce spermaceti substitutes with M.P.'s ranging from 42-52° C., free fatty acid contents from 0-3%, iodine values from 4-75, saponification numbers from 115-140 and unsaponifiable contents of 33-52%.

Groggins[8] states that the hydrogenation of oleic acid is an excellent starting point for the synthesis of oleyl and stearyl alcohols and their esters. Pure oleic acid is pumped over 100 cc. of catalyst at the rate of 400 cc. per hour, the hydrogen flow being about 15 cubic feet per hour and the pressure 2800 lbs. per square inch. The temperature is varied between 350-420° C. The reaction product varies from a composition of 19% acid, 36% ester, 39% alcohol at 350° C. to 1% acid, 21% ester and 60% alcohol at 420° C. The lower temperatures are desirable in the formation of waxes and the optimum temperature is about 390° C.

Esterification is one of the most useful reactions for preparing wax substitutes or replacements. The field of application is so wide and varied that space does not permit the review of all possible applications. German patent No. 550,324 (1928) describes the formation of high melting esters formed by the inter-reaction of the wax acids in montan with polyhydric alcohols. If beeswax is treated with a small amount of litharge and red lead for about one-half hour at 225° C., a product is formed with a melting point of 78° C. which is suitable for leather polish manufacture. Grun[9] describes the synthesis of secondary wax alcohols by heating ketones with ethyl alcohol in molecular proportions in the presence of a strong base at a temperature of about 300° C. for about 6-8 hours. Among the wax alcohols prepared were the following:

Pentatricontanol . $(C_{17}H_{35})_2CHOH$
Hentricontanol ... $(C_{15}H_{31})_2CHOH$
Heptacontanol ... $(C_{13}H_{27})_2CHOH$
Tricosanol .... $(C_{11}H_{23})_2CHOH$

Various esters suitable as waxes may be prepared by reacting these secondary wax alcohols with various fatty acids.

The extensive subject of fatty acid esters has been discussed by the writer in an article recently submitted for publication to one of the cosmetic journals. This article bears the title "The Manufacture and Application of Aliphatic Esters of the Polyhydric Alcohols." The commercial preparation of glycol and glycerol esters of stearic and similar fatty acids is described at length. The function and proportions of a wide variety of catalysts as well as manufacturing procedures forms the major part of the discussion. Numerous formulae for the application of these products in cosmetics and pharmaceuticals as well as other commercial preparations are likewise included.

We will however present the basic reactions included therein to give an idea of the type of reactions and reaction components involved, the following basic reactions are repeated on the next page.[10] It will be noted that these reactions are all designed for the formation of the monoesters. These products are excellent emulsifiers and excellent beeswax substitutes.

The Carbowaxes (Carbide & Carbon Chemical Corp.) are high molecular weight polyglycols which range in melting point from 35-53° C. and which may be utilized as beeswax substitutes or

$$\begin{matrix} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COOH \xrightarrow[\text{heat}]{\text{(catalysts)}\ CO_2—SO_2—N_2} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + HOH$$

$$\begin{matrix} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COOH \xrightarrow[NaHSO_4—Na_2SO_4\ \text{(heat)}]{\text{(catalysts)}\ Na_3PO_4—NaHCO_3} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + HOH$$

$$\begin{matrix} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOOCH_{35}C_{17} \\ | \\ CH_2OOCH_{35}C_{17} \end{matrix} \xrightarrow[\text{heat}]{\text{(catalyst)}\ Na_3PO_4} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + HOH$$

$$\begin{matrix} CH_2Cl \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COONa \xrightarrow[\text{heat}]{} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + HOH$$

$$\begin{matrix} CH_2ONa \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COCl \xrightarrow[\text{heat}]{} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + NaCl$$

$$\begin{matrix} CH_2ONa \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + 2\ C_{17}H_{35}COOH \xrightarrow[\text{heat}]{} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COONa$$

$$\begin{matrix} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + C_{17}H_{35}COCl \xrightarrow[\text{heat}]{} \begin{matrix} CH_2OOCH_{35}C_{17} \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + HCl$$

$$CH_2OH\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_2OC_2H_5 + C_{17}H_{35}COOH \xrightarrow[\text{(heat + catalyst)}]{} \begin{matrix} CH_2OOCH_{35}C_{17}\text{-}CH_2\text{-}O\text{-} \\ CH_2\text{-}CH_2OC_2H_5 \\ + HOH \end{matrix}$$

emulsifying agents. They may be reacted with high molecular weight acids to form interesting esters suitable as synthetic waxes. The Spans and Tweens are esters manufactured by the Atlas Powder Co. The former represent a series of technical long chain fatty acid partial esters of hexitol anhydrides which range from oily liquids to solids with an M.P. of 52° C. The latter compounds comprise a series of polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters. The latter are for the most part oily liquids although one of the series has a titer of 33-37° C. Th can be used alone as emulsifiers or a mixed with other waxes to achieve se emulsifying effects.

Natives use this crude filter press to remove impurities from carnauba wax.

Certain of the aforementioned synthe compounds may be further treated as the case of hydrogenated castor oil whi consists chiefly of 12-oxystearic ac triglyceride. If this latter material added to behenone in the proportion 80 parts of the castor oil to 20 par of the latter compound an excellent su stitute for carnauba wax is obtained This compound proves satisfactory f the preparation of shoe polishes. If f example stearone (M.P. 88° C.) or mo tanone are used in place of behonone, sim lar results are achieved. In place of th aforementioned ketones, high molecul weight alcohols such as pentatricontan or esters of the alcohols such as dimyric oxalate or cetyl palmitate may be em ployed.

It is feasible of course to react certa of the natural waxes such as candelil with added amounts of higher alcoho such as obtained from the oxidation paraffin to form new and valuable com pounds. Or, the high straight hydroca bon content of candelilla may be partiall converted into acids or higher alcohols b the process of oxidation and these in tur appropriately reacted if so desired wi the appropriate acid or alcohol. Ca should be exercised in the latter case first *deresinify* the candelilla by treatme with ceresine, paraffin or ozokerite. Or cury wax may be similarly processed.

An extremely wide variation in meltin point and properties is available whe natural waxes are blended together. Whe montan and candelilla waxes are mixe the M.P. will range from 70° C. for blend of 10% montan and 90% candelill to 70° C. for a 50-50 blend and 86° for a combination of 90% montan an 10% candelilla. Carnauba and candelil mixtures exhibit an 83° M.P. for a 90-1 blend. A 10% carnauba and 90% ca delilla gives a 71° C. M.P. with a other mixtures falling between thos values.

The following data represent mixture of similar type:

% Carnauba	% Beeswax (Ref.)	M.P. of Mixture °
90	10	85
70	30	72
50	50	64
30	70	61
10	90	59

% Carnauba	% Montan (Crude)	M.P. of Mixture °
90	10	68
70	30	71
50	50	75
30	70	79
10	90	80

% Carnauba	% Paraffin (55° C.)	M.P. of Mixture °
90	10	85
70	30	84
50	50	82
30	70	80
10	90	70

Koch, Hable and Wrangell[13] present a

interesting study of binary and ternary mixtures of waxes such as carnauba, paraffin, beeswax, candelilla, chinese insect, ozokerite, and montan. Interesting ternary mixtures that have proved satisfactory for use in the manufacture of lithographic inks and carbon papers have the following composition and melting points.[14]

	Parts by Weight	
Carnauba Wax	90	Pale Yellow Color
Paraffin (124 AMP)	**60**	M.P. 79-80° C.
Cumar MH	30	
Carnauba Wax	90	Almost White
Paraffin (133 AMP)	60	M.P. 80-81° C.
Cumar MH	30	
Carnauba Wax	**90**	
Paraffin (138 AMP)	60	M.P. 77-78° C.
Cumar MH	30	
Carnauba Wax	90	
Paraffin (135-37 F.)	60	M.P. 76-77° C.
Cumar V	30	
Carnauba Wax	90	
Paraffin (180-85 F.)	60	M.P. 90° C.
Cumar MH	30	S.P. 82-84° C.
Carnauba Wax	90	
Neville No. 9	27	M.P. 86-88° C.
Paraffin (143 AMP)	60	Almost White
Carnauba Wax	90	Light Gray
Cumar W	30	M.P. 96° C.
Paraffin (128 AMP)	60	S.P. 86° C.

Mantell and Allen[15] present an interesting study of mixtures of the natural waxes and the natural resins. They discuss the miscibility of resins such as Batavia Dammar B, Black East India, Pale East India, Elemi and Singapore Dammar No. 2 with waxes such as Carnauba, Beeswax, Japan, Montan and Ozokerite. The melting points of these mixtures range from 42-99° C. depending upon the specific wax and resin used. Paraffin and resin mixtures are likewise discussed.

One of the most vital problems facing manufacturers of water emulsion waxes has been the unavailability of carnauba wax. This difficulty has been alleviated to a great extent by the development of carnauba wax substitutes. These have proven quite satisfactory in most respects. Mixtures of carnauba wax with thermally processed congo resin (run resin) have exhibited remarkable properties. Mixtures of candelilla (refined) and carnauba or oricury wax and carnauba have likewise served to advantage. What is probably the most interesting phase of this new trend is the excellent products obtained by the admixture of carnauba or candelilla waxes with such resins as the modified terpenes. Examples of the latter are Durez and Piccolyte. When mixtures of these latter resins and waxes are properly compounded they may be directly substituted in place of the natural carnauba with no need for change in the formulation. Oftentimes, desirable properties not present with the natural wax are imparted to the emulsion, such as water-resistance, lighter color and increased slip resistance as well as better wear and traffic resistance. Since the refractive index of such mixtures is considerably higher than that of the natural wax alone, increased gloss is noticed.

The writer has spent much time in investigating the physical chemical aspects of the phenomena associated with the formulation, manufacture and characteristics of the complex colloidal system commonly referred to as a water emulsion wax. In the course of that work it was found that characteristics requisite for a material suitable for colloidal dispersion and subsequent stable suspension are intimately associated with the crystallization characteristics of the wax. It appears, so far, that the material must have a more or less definite crystallization rate. Since this was a purely theoretical conclusion, experiments were performed to corroborate the theory. Synthetic compounds were prepared and their crystallization rates compared with those of carnauba and candelilla. These experiments proved successful in that materials of the same approximate crystallization rate as set forth by the conditions of the procedure and technique proved to have properties almost identical with those of the natural carnauba wax. These findings as well as the use of this procedure for the quantitative and qualitative determination of

MARINE VICTORY GARDENS

CERTAIN SEAWEEDS, products of which are essential in bacteriological research and useful in scores of food industries and industrial processes, have become so scarce that two laboratories of the Fish and Wildlife Service and at least a dozen State and private institutions are attempting to develop new sources of supply, according to a report submitted to Secretary of the Interior Harold L. Ickes.

The varieties chiefly affected are several species of red seaweeds from which commercial agar is derived, half a dozen brown seaweeds which yield the important chemical known as algin, and the more familiar Irish moss. With imports of most of these marine plants reduced or eliminated by war conditions, the relatively undeveloped seaweed industries of the United States have been called upon for greatly increased production.

Before the war, 92 per cent of the agar used in the United States was imported from China and Japan. With this supply cut off, the War Production Board acted to conserve existing stocks for their most essential use—as a culture medium in bacteriological laboratories—by reserving all agar for this purpose. Other prewar uses included the manufacture of dental impression materials, laxatives, and emulsifiers.

The agar of commerce is derived from several related species of red seaweeds which occur in California and Mexico and possibly in other areas along the coast of North America. The agar weed grows on rocks from the tide line to depths of fifty or sixty feet, always in rough waters, and is usually gathered by divers who crawl over the rocks and pull off the weed by hand. A good day's harvest is 1,000 wet pounds. Because of weather conditions, little can be gathered during the winter.

Technologists of the Fish and Wildlife Service are now investigating the possibility of extracting agar from other seaweeds which may be more abundant. The Service's laboratories at College Park, Maryland, and Seattle, Washington, are both engaged in a study of the seaweed problem, the work of the Seattle staff being carried on in cooperation with the Scripps Institution of Oceanography at La Jolla, California.

unknown waxes and wax mixtures are discussed in the literature.[11]

The value of this method is shown in the accompanying graph wherein six synthetic waxes are compared with carnauba and candelilla. These crystallization curves are prepared by dissolving known amounts of the wax in a solvent—normal heptane—and allowing them to crystallize. The percentage of wax is plotted against the first observable crystallization point and the latter indicated as temperature. Waxes H, G, E, D, C, and A are all synthetics. Waxes F and B are carnauba and candelilla respectively. The first five of the synthetics proved on actual test to have properties of dispersion comparable with carnauba. The last of the series, A, proved very similar to candelilla.

The extraordinary aspect of this method arises from the fact that those compounds having curves quite similar to that of a known natural wax have colloidal properties similar to it. The value of this procedure in determining the value of unknown synthetics or mixtures can therefore be appreciated in that there is no need for the preparation of a finished commercial property in order to determine the efficiency or performance of a synthetic. That can be done merely as a confirmatory measure.

Interesting mixtures can also be prepared by the addition of small amounts of methyl abietate (Abalyn) and hydrogenated methyl abietate (Hercolyn) to either the natural or synthetic waxes. The same holds for the addition of either Poly-Pale resin or Belro resin to the natural waxes. Of course, certain materials are not currently available because of war requirements, but high melting point compounds can be prepared from the natural waxes by the use of heat reactive phenol-formaldehyde resins such as Bakelite BR-3360.

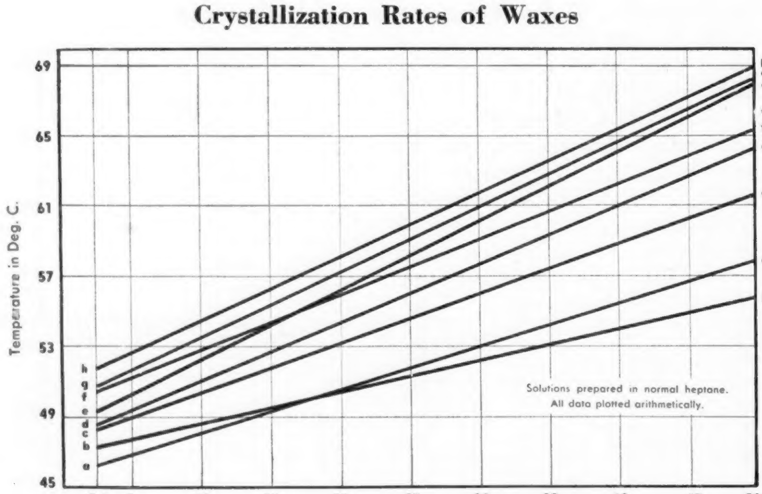
One of the most interesting recent developments in wax technology and a step that should be productive of extremely interesting and valuable results is the use of ethyl cellulose in conjunction with waxes.[16] Results with other materials are also interesting and worthy of further study. The following data will serve as an example:

Product	Ethyl Cellulose, 325 cp	Softening Point, °C.	Melting Point, °C.
Solid Aroclor (129° C.)			
Parts	Parts		
90	10	128.0	137.0
75	25	125.0	128.0
Beeswax (62.5° C.)			
90	10	99.5	103.5
75	25	141.5	144.0
50	50	178.0	182.0
Candelilla (68° C.)			
90	10	69.0	75.0
75	25	111.0	130.0
50	50	135.0	142.0
Carnauba (82° C.)			
90	10	92.0	100.5
75	25	119.5	122.0
Japan Wax (41° C.)			
90	10	60.0	69.0
75	25	75.0	121.0
50	50	138.0	182.0
Linseed Oil Fatty Acid (liquid)			
75	25	51.0	64.0
50	50	80.0	110.0
Crude Montan (83° C.)			
90	10	85.0	87.5
75	25	104.0	112.5
50	50	143.5	145.0
Montan Pure (69.5° C.)			
90	10	73.0	86.5
75	25	110.5	115.0
50	50	129.0	134.5
Oleic Acid (liquid)			
50	50	105.0	106.0
Spermaceti Wax (45.5° C.)			
90	10	78.5	91.5
75	25	120.0	127.5
50	50	129.0	131.5
Stearic Acid (55° C.)			
90	10	55.0	56.0
75	25	64.0	71.0
50	50	91.0	114.0
Tallow (35° C.)			
90	10	38.0	62.0
75	25	106.0	151.0
50	50	112.0	165.0

The general effect of the addition of ethyl cellulose to waxes is to increase the melting point, toughen the mixture, avoid crystallization and increase the viscosity. The solubility of ethyl cellulose in fatty alcohols is excellent.[16]

It will be seen from these results that ethyl cellulose will prove to be a ready and simple means of increasing the hardness and decreasing the crystallinity of synthetic mixtures if such additions are warranted by the nature of the finished product.

Crystallization Rates of Waxes

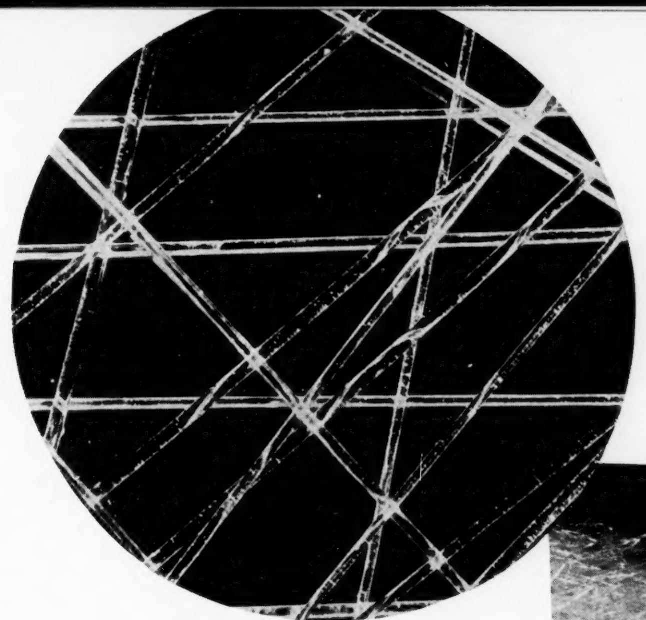


Name		Notation	M.P. °C	Purpose
Synthetic	No. 221	h	81.5	Carnauba substitute
"	222	g	71.0	" "
"	223	e	72.0	" "
"	224	d	80.5	" "
"	225	c	70.0	" "
"	226	a	70.5	Candelilla substitute
Carnauba ref.		f	82.0	
Candelilla ref.		b	67.0	

These compounds represent the result of blending several quite different components in an effort to duplicate the carnauba and candelilla curves as determined by the crystallization method.

References

1. Ralston & Christensen; High Molecular Weight Alkyl-Aryl Ketones. Ind. Eng. Chem., Vol. 29, pg. 194, Feb., 1937.
2. Ellis; The Chemistry of Petroleum Derivatives. Chap. 36, pg. 830, Reinhold Publishing Co., 1934.
3. Holde; Chem. Ztg., 1920, *44*, 477.
4. Luther & Dietrich; U. S. Patent No. 1,931,501.
5. Grun; British Patent 183, 186, 1921.
6. British Patent 320,854, 1928.
7. Glickman, Chas. S.; Synthetic Waxes. Soap, Sept. & Oct., 1936.
8. Groggins; Chap. 8, pgs. 475-6, Unit Processes in Organic Syntheses, McGraw-Hill Book Co., 1938.
9. A. D. Grun; 2 Angert Chem. 39-421, 8-1037, 1926.
10. Glickman, Chas. S.; The Manufacture and Application of Aliphatic Esters of Polyhydric Alcohols. (To be published).
11. Glickman, Chas. S.; The Crystallization of the Natural and Synthetic Waxes: Their Qualitative and Quantitative Determination. C. S. Glickman, 220 Broadway, New York, N. Y.
12. U. S. Patent No. 1,928,438.
13. Koch, Hable and Wrangell; Melting Point Studies of Binary and Trinary Mixtures of Commercial Waxes; Ind. Eng. Chem., Analytical Edition, Vol. 10, No. 3, 1938.
14. Glickman, Chas. S.; Melting Points of Ternary Wax Mixtures, C. S. Glickman, 220 Broadway, New York, N. Y., 1942.
15. Manteil & Allan; Solubility of Natural Resins in Solvents and Waxes. Ind. Eng. Chem., Vol. 30, pg. 262, March, 1938.
16. Notes on Ethyl Cellulose in Wax Mixtures. Hercules Powder Co., Wilmington, Delaware, March 13, 1936.



Glass Fibers Offer Possibilities In Chemical Process Equipment

GLASS fibers offer interesting possibilities for both war and post-war applications in the chemical processing field. A number of such fibers having various physical properties and forms are now on the market for use with other fibers, plastics and cements, and for use in various types of industrial and chemical process equipment.

One of the current uses of glass fibers is as tower packing in ethyl alcohol rectifying columns. It is reported that a marked speed-up in the production of alcohol has been achieved through this use of the fibers. Other potential processing uses include evaporation, diffusion and fractionation applications in which the surfaces of the fibers may be wetted to increase the film surface of a liquid that is to be evaporated or otherwise chemically or physically modified.

Filtering of air or gases, liquids and sludges by the straining method is another potential field of use. The substantially cylindrical, smooth-surfaced fibers provide comparatively low resistance to the flow of liquids, yet the interstices between fibers may be modified to provide almost any degree of porosity by the choice of the proper fiber size and by the density at which the fibers are packed.

Still other potential processing uses are contact applications in which water is sprayed on the fibers to humidify or dehumidify air that is forced through them, and eliminator applications where the fibers are employed to gather free particles of water or other liquids entrained in the air stream.

Glass-Plastic Combinations

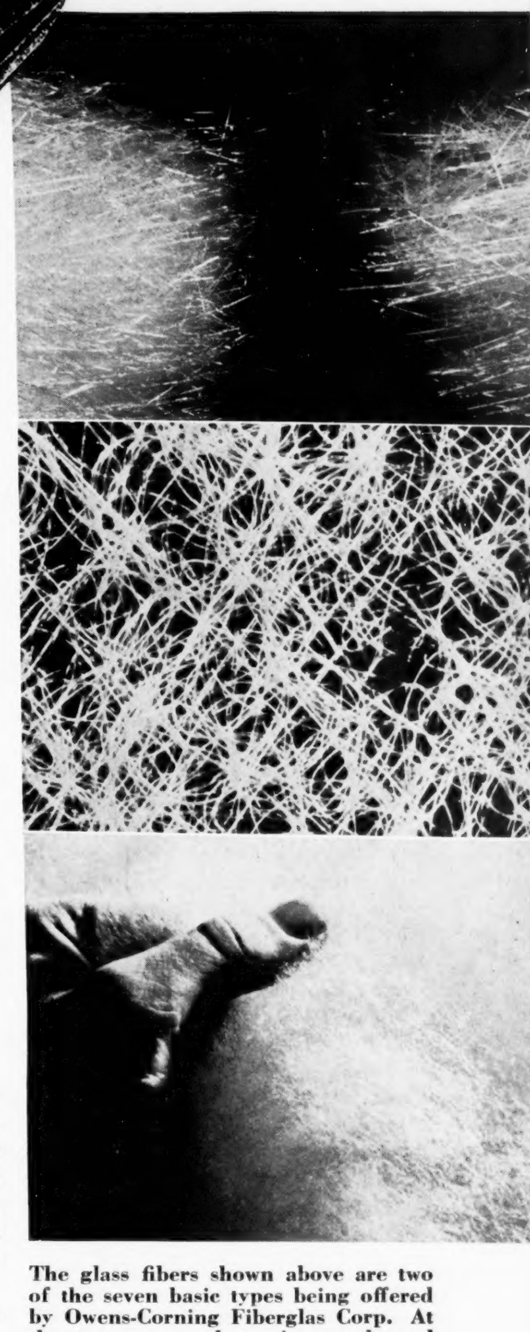
Glass fibers are now being used in combination with plastics where they serve as reinforcement for light-weight, high-strength structural parts for aircraft. The glass-plastic parts can be molded at low pressures, reducing fabrication costs and man-hours. Experience indicates, according to one manufacturer, the adaptability of the fibers to similar use as reinforcement for certain cements and plaster-like materials where their high tensile strength may give improved physical properties to the resulting product.

Another potential field of use is the admixture of the glass fibers with other fibers, as in felts and papers. It is believed by the manufacturers that the high tensile strength and non-stretching and non-shrinking characteristics of glass fibers will contribute new and valuable properties to other fiber and textile materials if means can be found to combine the raw fibers economically. Fabrics combining glass with cotton, rayon and asbestos are now manufactured by combining the yarns of the desired types.

Properties

The different types of glass fibers now available are distinguished by differences in fiber diameter, tensile strength and the glass compositions employed. Resistance to acids, weak alkalis, high temperatures, and severe weathering, may be obtained in varying degrees depending on the glass composition.

Glass fibers have made possible substantial reduction in size and weight of insulating materials needed in electric motors and other electrical equipment. Special glass textiles are being used in important military equipment, and glass insulating materials are permitting savings in the building of warships, tankers, cargo vessels and aircraft.



The glass fibers shown above are two of the seven basic types being offered by Owens-Corning Fiberglas Corp. At the top are a photomicrograph and actual size photo showing straight fibers having an average diameter of 0.0080 in. and surface area of 38.7 sq. ft. per lb. At the bottom in enlarged and actual size are curly fibers having an average diameter of 0.00115 and surface area of 262 sq. ft. per lb. The curly fibers provide low density and high resiliency.

Courtesy International Printing Ink

The printing art is making good use of the products of modern chemistry, but ink manufacturers are still looking for better drying oils. Here is what's being used and what's needed.

Present Day Use Of Natural Oils and Resins in Printing Inks

By *F. E. Petke and C. H. Allen*

The Hilton - Davis Chemical Company

DEMANDS on the ingenuity of printing ink manufacturers are tremendous. The popular conception of printing inks is limited largely to those used for newspapers, magazines and books, but while the consumption of such inks is enormous, they represent but a small portion of the varied requirements being filled every day by the industry.

For example, there is a big demand for inks that will print on bread wrappers, on plastics, glass bottles, tin cans, leather goods, textiles of all kinds, burlap, wallpaper, and scores of other materials and types of surfaces, each having their own distinct requirements. There are special inks for the preparation of decalcomanias for decorating walls and furniture. And on top of this, demands on the ink maker are further complicated by the many types of printing methods used and by the many conditions of exposure and use under which printed surfaces must stand up.

As is indicated by the title, this article does not attempt to cover the entire broad field of printing ink manufacture. It is concerned only with printing inks from the standpoint of their use of chemurgic raw materials—principally natural oils and resins. It must not be assumed from this, however, that all printing inks depend upon products of agriculture or that there is a definite partition between inks made from natural products or chemically treated natural products and the inks of strictly synthetic materials. There are very few inks which fall clearly into either group. A great many inks are combinations of natural oils and waxes with natural or modified rosins and synthetic resins.

Types of Inks

Many types of printing inks are known, but most of them fall into one of four classes. These classes may be described as inks which dry by (1) oxidation, (2) polymerization, (3) absorption, and (4) solvent evaporation.

Some types of inks will fall into more than one of these divisions. For example an ink may contain a solvent and a resin which will polymerize when heated. The solvent removal and polymerization could take place simultaneously when the printed surface is passed over a hot roll.

With the development of power driven presses came the demand for faster drying inks. This was followed by the application of printing inks to materials other than paper. The use of decorated paper packages also created a demand for inks which would withstand the materials packaged. These demands ushered in the modern period of printing ink manufacture. Although the early printing inks were wholly dependent on natural sources for vehicles, the need for specialized inks demanded the use of synthetic resins and an increasing variety of drying and semi-drying oils. The tremendous increase in the use of inks for all purposes greatly increased the demands upon agriculture.

A printing ink consists essentially of a pigment suspended in a vehicle. Both the pigment and the vehicle are modified to adapt the finished ink to use by one of the various printing methods. Special types of inks must be modified to increase or decrease their drying time by using the proper balance of driers. Others must be modified to increase or decrease tack. Either the pigment, the vehicle or the finished ink must be modified to give good wetting of the pigments and to eliminate offset, striking through the paper, etc.

Now let us examine some of the materials which are used in printing inks. These materials can be divided into four main groups: namely, pigments, vehicles, driers and modifiers. At present there are no natural coloring materials used to a great extent in the printing ink field. There are, however, a great many pigments which use chemurgic materials in their preparations. Many of the pigments such as lithols are resinated to give proper dispersion and strength. Other colors are prepared with sulfonated oils which in some cases actually become part of the color molecule. In the preparation of tannin tartar lakes, tannic acid is used as the precipitant for water soluble dyestuffs. Many pigments are treated with sulfonated oils and fatty acids to make them dry soft enough to be ground in the vehicle.

Toward Better Drying Oils

THE FUTURE should produce better drying oils for printing ink manufacture. Among those properties which are in need of particular attention are speed of drying time, rapid wetting of pigment, good body and flow, and freedom from livering. The inks should dry to give reasonably hard films which have good resistance to water, mild chemical agents, rubbing and scratching.

These are qualities now obtained only by the addition of special modifiers to the inks. Through research it should some day be possible to develop a drying oil which will give excellent inks without the addition of modifying agents, thus greatly simplifying the manufacture of printing inks. —F. E. Petke and C. H. Allen.

Ink Vehicles

The preparation of vehicles for printing inks calls for the largest use of natural products. As stated earlier, one of the first vehicles used in the printing ink industry was bodied linseed oil. The preparation of linseed oil in the early days was a peculiar procedure. It consisted of heating the raw oil and igniting it. After burning for a few minutes the flames were extinguished by covering the kettle with a tight lid. Sometimes pieces of stale bread were stirred in the oil until they turned brown. This treatment was supposed to have removed the "greasiness." Peeled onions were also used for the same purpose. Since these early days, a great deal of work has been done to improve linseed oils for use in printing inks. Much of this work has been of an academic nature, so that the bodying procedure could be varied to give the best possible product. Linseed oils have been bleached, decolorized and dewaxed. The oils have been carefully bodied in order to obtain inks of good body and flow. Much experimental work is still in progress along these lines.

After an ink is mixed, it is compared with standards as to color and physical properties by making a "draw down" in full tinctorial strength and extended with white. *Courtesy International Printing Ink*

Other vegetable oils which are used to a great extent in the preparation of printing inks are china wood or tung oil, oiticica oil, perilla and castor oil. The castor oil is not used much as such except as a plasticizer, but dehydrated castor oil is a better drying oil than linseed oil. It resembles tung oil and has almost no odor. Soya bean oil, hydroxylated soya bean oil, and dehydrated soya bean oil have found application in the field of printing inks.

Many other oils have been investigated for drying properties. These include tomato seed oil, sunflower seed oil, grape seed oil, hempseed oil, rapeseed oil, walnut oil and safflower seed oil. Hempseed and walnut oil have been classed as nearly equal to perilla oil and rapeseed oil has been described as valueless since it never dries.

Drying Speed Important

A great deal of work has and is still being done to increase the drying speed of oils. The drying of an oil depends upon the presence of double bonds in the fatty acid portion of the oil and the relative position of these double bonds to each other. This fact has led to the investigation of methods for increasing the number of double bonds and rearranging double bonds into conjugated systems. Linseed oil has been treated with catalysts such as metallic oxides, silica, bentonite kieselguhr and similar substances. Some of this work has been reported in the literature, but the results obtained have been disputed in some cases. The dehydration of castor oil has given oils which have very good drying properties.

Cottonseed oil has been oxidized at elevated temperatures in the presence of catalysts. This oxidized oil has then been dehydrated in the presence of other catalysts to produce a drying oil.

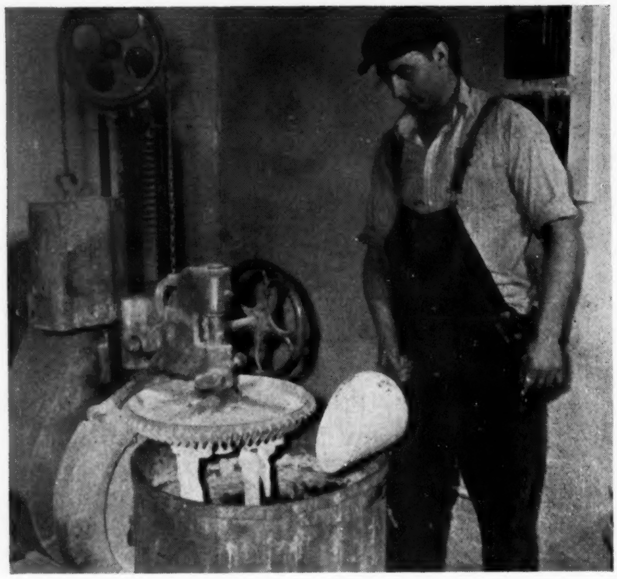
Drying oils have also been polymerized in the presence of catalysts. These catalysts have greatly decreased the polymerization time, yielding bodied drying oil of low acid value and better color. Sulfur dioxide has been used to increase the rate of polymerization.

The rate of drying of an oil is not solely dependent upon the number or arrangement of double bonds in the fatty acid portion of the molecule but also on the alcohol portion of the ester. Free fatty acids and their esters of monohydric alcohols do not dry to a solid film. The esters of dihydric alcohols show slow drying time. The esters of glycerol show real drying properties. More rapid drying can be obtained by esterifying alcohols containing more than three hydroxyl groups. Fatty acid esters of dextrose, mannitol and other polyhydric alcohols have been investigated. Many results can be expected from research along these lines and the conversion of many oils now classed as non-drying to drying oils is a possibility.

Interesting properties are obtained by combining natural oils with alkyd resins. The inks prepared in this manner dry rapidly to tack-free films. By choosing the proper alkyd resin it is possible to obtain tough films which are very resistant to rubbing.

Rosin

Another natural product which plays a very important part in the printing ink



Chain can mixer for dispersing pigment in a fluid vehicle.

Courtesy Fuchs and Lang Mfg. Co.

industry is rosin. Rosin itself has been used along with drying oils and non-drying oils for the preparation of printing inks. There are many grades of rosin available today depending upon the source and the method of treatment. Many of the straight rosin inks dried to give a tacky film which caused printed sheets to stick together. Limed rosin and zincated rosin were prepared to raise the melting point of rosin, and these were followed by ester gum which is the glyceryl ester of rosin. Large quantities of ester gum are used in the preparation of printing inks. There are now available limed and zincated rosins of much higher melting point than the earlier products, and these are finding wider applications in the printing ink industry. Other esters of rosin, including those of glycol, pentaerythritol and diethylene glycol, are being used in the manufacture of printing inks. The rosins are also used to a great extent in modifying many synthetic resins particularly the phenolic and alkyd resin types. Rosins have been polymerized, hydrogenated and dehydrogenated to give products which are finding extensive applications in the ink industry.

For specialty inks, materials such as casein from milk and mazein from corn are used to prepare the vehicle. The inks prepared with these materials have the property of adhering to many surfaces on which linseed inks will crawl. Casein is used to a large extent in the preparation of emulsion inks as a stabilizer and in the form of an alkaline salt as an emulsifying agent. Casein solutions are also used as binders in some of the water type inks.

Many inks require the use of driers to decrease the drying time of the ink. The driers used are chiefly metallic salts of various fatty or other organic acids. Large quantities of cobalt, lead and manganese resinates, linoleates and naphthenates are used in the printing ink industry. These driers can be prepared by fusion or precipitation and their properties will be affected by the grade of oils or rosins used in their preparation.

Use of Modifiers

Perhaps the greatest variety of raw materials in the whole printing ink field are those needed in the preparation of modifying "compounds" which are used to alter the working properties of inks on the printing presses. These modifiers may give better inks because of (1) better pigment wetting, (2) increasing or decreasing tack (3) plasticizing action (4) prevention of livering (5) regulation of drying time (6) better non-rub properties (7) prevention of offset and sticking.

For better pigment wetting a variety of substances may be used, the choice of which will depend upon the pigment and the vehicle. Such materials as sulfonated castor oil, metal soaps, lecithin and fatty acid amides have been used for this purpose.

For plasticizing the dried ink films many substances have been used. The proper choice is largely determined by compatibility of the plasticizer with the vehicle. Castor oil, hydroxylated linseed oil, soya bean oil, hydroxylated soya bean oil, mineral oil and soft resins have been used for this purpose. In some cases the driers used in the ink also act as plasticizers.

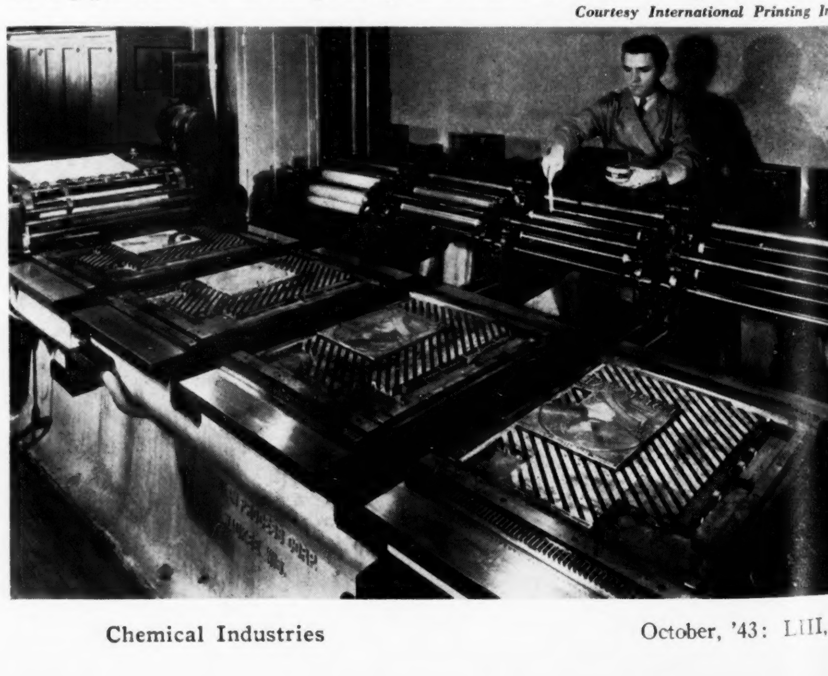
For preventing livering of inks various materials have been used, chiefly linseed fatty acids, tannin, albumin, phosphoric acid, maleic acids, etc. The livering of inks is not very well understood and the literature gives conflicting theories as to the causes of this condition.

We have shown by many examples the close community of interests between agriculture, the chemurgic laboratory and the printing ink industry. Linseed and soya bean oils from selected varieties of flax and soya plants and various other oils and products are already coming from our farms. Forestry provides rosin which is the basis of a great variety of modified resins and plasticizers. The plant specialists and chemists of the laboratory are constantly improving all these products. They already are making possible the production of greatly improved drying oils, and the future holds bright promise for many more important advancements. The printing ink industry daily faces urgent demands for new varieties of inks to meet the requirements of an exacting industrial world. The formulation and production of these new inks is made possible through contributions from each of this great trio of co-workers.

Based on a paper "Printing Inks from a Chemurgic Angle" presented by the authors at the Fourth Mid-American Chemurgic Conference, Cincinnati, September 30, 1943.

Testing process inks for wet printing on a four-color Claybourn proving press.

Courtesy International Printing Ink



The Safe Handling and Storage of Anhydrous Hydrofluoric Acid

By *Charles M. Fehr*

Pennsylvania Salt Manufacturing Company

A relative newcomer to the ranks of industrial chemicals, anhydrous hydrofluoric acid can be a dangerous animal if not handled properly. But, like most other things, it is perfectly tame and gentle in experienced hands. Mr. Fehr has been associated with hydrofluoric acid since 1919 and in 1931 supervised the manufacture and shipment of the first anhydrous material produced commercially in the U. S.

ALTHOUGH hydrogen fluoride was discovered in 1768 by Margraff, it was not available for commercial use in its anhydrous form until 1931. Prior to that year it was produced only in aqueous solutions ranging from 30 to 60% HF by weight. Today it is a new and important industrial chemical in oil refining.

We have much to learn about AHF. However, as with any new substance, users are asking a number of questions concerning handling and storage, and we are attempting to answer them. The information given here is limited, but it is based on the best technical facts available. Some of it is proven and exact, some a reasonable approximation, and the balance is "know how."

Before considering its various properties it is well to point out that at 98% or higher AHF is an entirely different compound as compared with the weaker forms previously used in commerce. As it increases in strength changes take place in gravity, boiling point, freezing point and, most important of all, its attack on materials of construction. The gravity rises to a maximum of approximately 1.259 at 80% strength and then drops off as the strength increases. Between 65% and 80% the corrosive characteristics of HF change. For example, below 65% it has a low corrosion rate on lead, while above 65% to 70% it attacks lead increasingly. Again, below 60% it has a high corrosion rate on steel, while above 80% practically no action occurs on steel of good composition. Similarly, rubber, Neoprene and many synthetic plastics show excellent resistance to weak HF but are increasingly attacked in strengths above 60% and 80%.

We are concerned here only with AHF, and its problems are peculiar and different from the problems involved with the lower strengths. It may be regarded as on the border-line between a true compressed gas and a corrosive liquid. As most of the experience of equipment manufacturers has to date been concerned with the handling of HF below 60%, many of the exasperating corrosion problems previously experienced will be eliminated with this form of HF.

Principal Properties

The following properties have direct relationship to the problem of handling:

Freezing point, approximately —117.4° F. This unusually low value assures that it may be stored and used in process at very low temperatures without the problem of solidification. For example, 66° baume sulfuric acid (93.19% H_2SO_4) freezes at —29° F. Likewise, 98% H_2SO_4 freezes at +36° F.

Boiling point, approximately 66.9° F. at atmospheric pressure. This is ideal, assuring ease of handling either as a liquid or a gas.

The vapor pressure, which is about 12 lbs. per sq. in. gauge at 100° F., assures storage in medium pressure vessels and its retention as a liquid at elevated temperatures without objectionable pressures.

The low viscosity and surface tension causes the acid to flow easily in comparatively small pipes. Less equipment is required and less time is consumed in transferring.

The heat of reaction with water is approximatelyy 11,500 cal. per formula weight. Less heat of reaction will be evolved than with other alkylation catalysts and temperature control should be simplified.

Heat of vaporization is about 6,000 cal. per formula weight, assuring its removal from reaction products by application of a small quantity of heat.

Materials of Construction

In our first work on the production of AHF in 1931, laboratory and pilot plant tests were conducted to determine roughly which materials were satisfactory or unsatisfactory. While these tests were helpful in the development of an entirely new process they did not tell the complete story. It was only after the process was actually in full-scale operation that real progress was made in determining desirable materials of construction. We found that because of its low corrosion rate, mild carbon steel was excellent for handling AHF and was the logical material for storage tanks, pipes, fittings, valves, and pumps. This conclusion has been sustained by experience during the past twelve years and today it may be positively stated that steel tanks for storing AHF have been in service for ten years and are in good condition today. The shipping container problem has been solved by the use of steel. Apparently a protective coating forms on the surface of the steel inhibiting further corrosion. This becomes a problem on valves in that it will cause valves to freeze unless operated at fairly frequent intervals. This is probably because the film cements moving parts together. By opening and closing valves at least twice each shift this operating difficulty may be avoided. Obviously, double-valving is required.

Some steel is more resistant to AHF than others. A thoroughly deoxidized, dead melted, or killed steel in which the non-metallic inclusions are absolutely at a minimum is the ideal steel. Bessemer steel is not desirable due to lack of precise control.

Our experience with Monel, has been satisfactory and it appears the best of all commercially available non-ferrous metals for AHF. However, with the present restrictions on the use of nickel alloys, steel is preferable wherever possible. For the fabrication of laboratory equipment for handling AHF, such as sample bottles, valve parts, especially valve stems, and for parts in contact with weaker acid, Monel metal is ideal and should be used.

Copper has been found satisfactory in various parts of the process. Under proper conditions it is a close second to Monel. It is, however, attacked in the presence of sulfur dioxide and oxygen and, where these are present in the AHF, copper is unsatisfactory. We recently examined a copper coil, put into operation in 1931 for two years and recently returned to service, finding it in an excellent state today. Copper tubing is excellent especially where flexible connections are needed.

In addition to these metals, silver and platinum may be employed where construction justifies. Platinum is probably the most resistant of all metals to AHF and silver has very excellent resistance in the absence of sulfides or appreciable quantities of sulfuric acid.

Readers are cautioned to interpret these recommendations as applying to AHF only, since steel is not satisfactory for HF below 60%. Copper, Monel, silver and platinum are resistant to the weaker acids except under the specific adverse conditions noted in the foregoing. Platinum and silver are particularly useful for small parts or for special members such as frangible discs.

Unsatisfactory Materials

Among the unsatisfactory materials of construction, probably the most readily attacked are those containing silica, such as glass, porcelain, enamelware, asbestos, certain silica cast irons, etc.

While lead is serviceable for acids below 65%, under normal conditions it is unsatisfactory for strong acids, especially AHF.

Cast iron is more resistant to AHF than lead but, probably due to silica inclusions, it is not a generally satisfactory material. Cast iron fittings will last only a comparatively short time before replacement.

Among other materials found unsuitable for AHF are wood, which chars instantly; rubber, which polymerizes and hardens, and most plastics. We have hopes, however, of a non-flexible plastic which is now being studied as a desirable material.

Shipping Containers

AHF is regulated by ICC as a hazardous article, being classified as one of the strengths of hydrofluoric acid. Strictly interpreted it is not a compressed gas although its shipping containers are compressed gas pressure vessels. A compressed gas is defined in ICC regulations as being any material with a pressure at 70° F. exceeding 25 lbs. per square inch gauge. AHF is only ½ lb. gauge pressure at 70° F. Its permitted shipping packages are:

Cylinders—ICC Spec. 3, 3A, 3B, 3C, 3E, 25 (all seamless steel cylinders of various types); 4, 4A, 4B, 4C, 38 (forge welded but not brazed cylinders of various types). Cylinders are filled to 85% of their water capacity, which means that a cylinder holding 100 lbs. of water brimming full can be loaded with not more than 85 lbs. AHF. We favor cylinders holding 235 lbs. net, weighing 428 lbs. gross.

Single Unit Tank Cars—Forge welded pressure vessels mounted on a running gear and forming a part of a complete tank car, specifically ICC Spec. 105A-500, better known as the ammonia, chlorine or propane car.

Shipping Container Valves—All steel or brass valves are in service. The all steel ammonia cylinder valve has been specially adapted to AHF service by replacing tin seat with copper and the provision of suitable packing. AHF cylinder valves are not fused. Valve outlet nipple openings are ⅜" American National Standard female taper pipe threads.

Like the chlorine and ammonia tank car domes, the AHF car is fitted with two gas valves on the cross axis and two liquid eduction valves on the longitudinal axis of the car. A specially fitted safety valve provided with a platinum protected frangible disc is centered between the four valves and set to be gas tight at pressures below 180 lbs. per square inch and wide open at 225 lbs. per square inch gauge. The outlet nipple opening connections of the two gas and the two liquid eduction valves are 1" American National Standard taper female pipe threads.

These cars are insulated and may be filled to 90% of their water capacity. Cars available from our works hold 11.6 tons and 21.6 tons respectively.

Storage Vessels

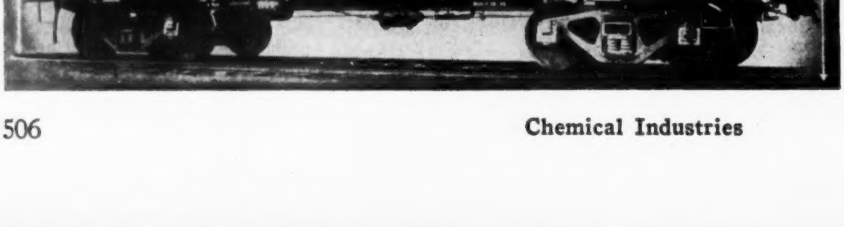
Steel tanks are the logical storage vessels for AHF and should be of welded construction conforming to paragraph U-68 of the A.S.M.E. code for unfired pressure vessels. Proper outage must be provided and insulated storage tanks should not be loaded to more than 90% of their water capacity—non-insulated tanks to 85%. Where feasible, scale mounted tanks are more preferable than level indicators because of minimum error and trouble. Bottom outlets on storage tanks should be avoided wherever possible by loading and unloading through a standpipe. When bottom outlets on storage tanks are unavoidable a drop plug valve should be provided as protection in case of valve failure. Storage vessels must be provided with a safety valve set to open at 2/3 of the working pressure of the tank and protected by frangible platinum discs.

Transfer of Acid

The transfer of AHF is a major problem which may be accomplished in two ways—by pressure padding with dry air or an inert gas, such as butane, or by pumping.

Pressure padding is indicated for the transfer of a volatile liquid such as AHF from tank cars and storage tanks equipped with well pipes. Pressure on the receiving tank must be depressed by occasional venting of gas from the top of the tank. In the manufacturing plant this gas is recovered in the absorbing system but in the refinery should be absorbed in an alkaline scrubber. The chief advantage of pressure padding is the elimination of pumps and bottom outlets on storage tanks. The packing problem on acid pumps is serious where strict acid specifications preclude the use of a special liquid

An anhydrous hydrofluoric acid tank car with a safety platform. Large tank car—capacity 21.6 tons A.H.F., 37′ 1″ bumper to bumper. Small tank car—capacity 11.6 tons A.H.F., 36′ 8″ bumper to bumper.



hydrocarbon pressure seal packing gland.

The alternate method of transfer is by means of centrifugal or positive displacement type pumps. For satisfactory operation these should be fed from a bottom outlet in a tank in order to avoid vapor lock. Packing problems on centrifugal pumps used in the refinery are minimized by specially designed liquid hydro-carbon pressure seal glands.

Flowmeters and weigh tanks are both used for the measurement of acid to process.

Piping and Valves

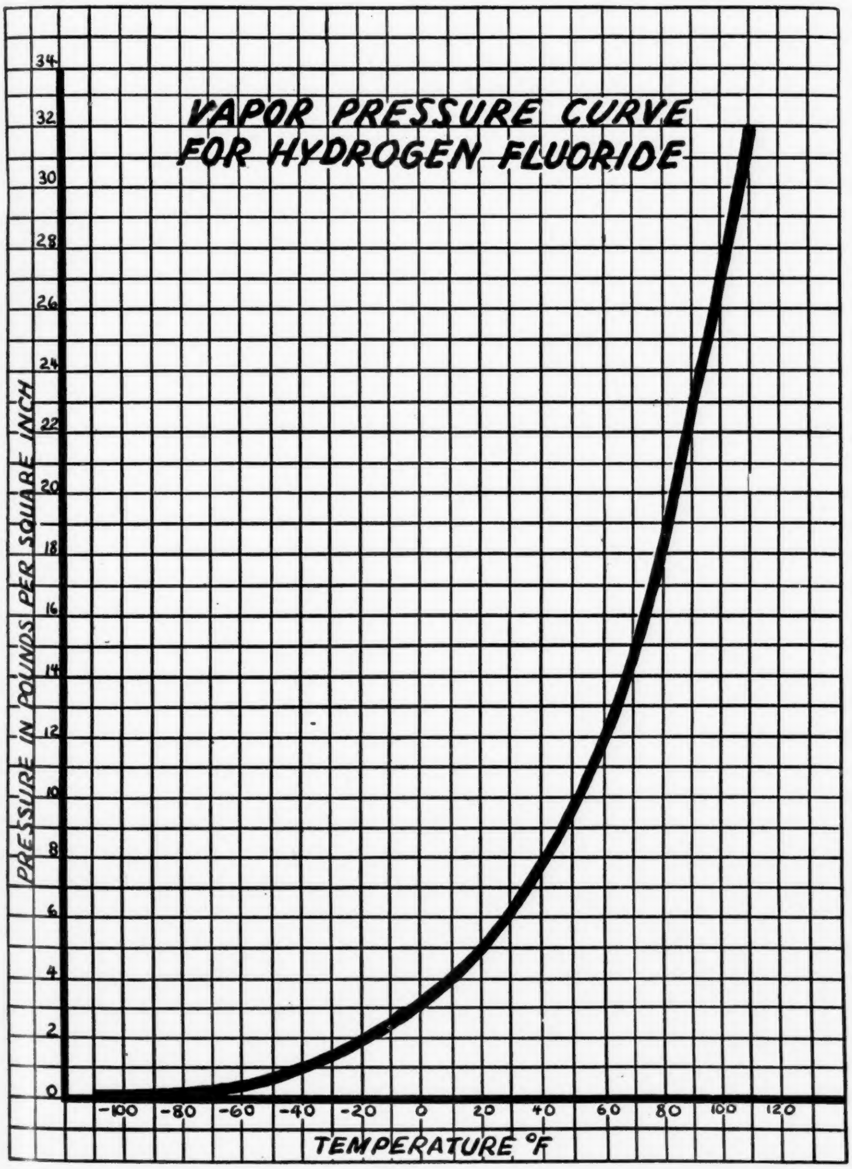
Extra heavy seamless steel pipe and forged or cast steel fittings are preferable for handling AHF. Welding makes the ideal joint, provided the weld is homogeneous and free of slag and oxides. Welded fittings should be used wherever possible. If threaded joints are used on small pipe, the threads should be carefully cut, pulled up tight and seal welded. Some designers do not seal weld pipe under ½" size, reporting threaded joints satisfactory. We caution against use of cast iron fittings.

For connecting pipe larger than 2", ring flanges with soft iron or copper gaskets are satisfactory. Neoprene or Vistanex impregnated asbestos gaskets have been successful especially on small lines.

Heavy copper tubing is satisfactory for flexible connections to scale mounted tanks.

Needle, globe and gate valves have been used successfully. Whenever application permits we prefer a needle or globe valve due to its sturdy construction. Steel is an excellent construction material and valves may be machined from bar stock or forged. Cast steel valves if used must be carefully examined for porosity and sand holes. Deep stuffing boxes and outside screw and yoke are desirable. The principal difficulty with all steel valves is freezing of the seats and corroded stems. Regular operation of the valve reduces freezing and Monel trim valves, especially stems, are an excellent freezing preventive. Corroded stems may be avoided by keeping the packing glands tight.

Our experience with lubricated cocks in AHF service has not been satisfactory, due to an unsatisfactory lubricant. We understand that improvements in design and lubricants have eliminated the difficulty. The principal advantage of lubricated cocks is the elimination of packing problems.



Pumps

Cast steel centrifugal pumps with steel impellers have given good service with the exception of packing difficulties. Packing problems on this pump have been greatly reduced by the use of liquid hydrocarbon pressure seal glands, but this application is not always permissible due to acid contamination.

Small positive displacement type pumps constructed of steel, Monel or special bronze have given good service; they are inexpensive, and we have found them more trouble-free for our operations than the centrifugal pump.

Obtaining suitable packing for pumps and valves and sheet packing for flanges is one of the most difficult problems encountered in handling AHF. However, packing manufacturers are developing improved packings and this difficulty is apparently being solved.

The ideal pump packing should be resistant to the acid, have compressibility and should not score the shaft. The shaft should be highly polished, smooth finish or with Monel sleeve. Resistance to the acid is obtained by use of copper or aluminum foil, or copper metallic braid. Compressibility is obtained by the use of heavily graphited and lubricated asbestos, Neoprene or Koroseal cores, which have been moderately successful. Anchor Packing No. 858, having a braided copper covering with a heavily graphited asbestos center, has been used with reasonable success for packing pumps and valves. We understand that a copper foil packing, with some of the rings containing a Neoprene or Koroseal core, is satisfactory for both valves and pumps. It is to be expected that pumps and valves packed with the best available materials will require regular inspection and removal of packing at intervals. Packing deteriorates at a higher rate on idle pumps and packing life can be conserved by starting up the pumps several times each shift. On larger valves with deep packing glands lubrication supplied through a lantern in the center of the gland is desirable to prolong the life of the packing.

Neoprene or Vistanex impregnated asbestos sheet has been successful for flange packing. We would not expect a flange joint gasket of this kind to be as satisfactory as metal gaskets. Tygon has shown promise in preliminary tests and may prove superior to impregnated asbestos sheet.

Recommendations on Construction

Welded joints are ideal for AHF and welding should be used wherever possible in the construction and erection of equipment, and should be used to seal threaded joints on small lines. Welds must be full, homogeneous and free of inclusions of slag and oxides. We have found a reverse polarity welding rod of the same composition as the material being welded desirable. Good welding requires good craftsmanship and it is desirable to specify A.S.M.E. Class III minimum welders.

Avoid overhead lines and slope acid lines to storage or drain tanks wherever possible. If pockets in acid transfer lines are unavoidable, methods of draining must be provided.

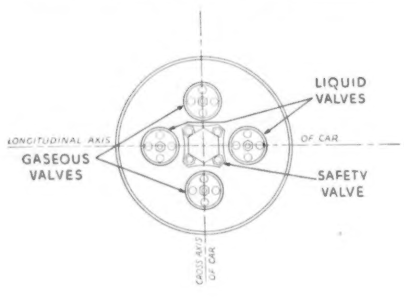
It is best practice to install valves below eye level with the packing glands vertical. The use of double valves is often indicated, and, in the case of globe valves, it simplifies repacking. Valves and pumps should be readily accessible, avoiding location in pits and areas congested with equipment. The repair of this equipment is not simple and may be greatly facilitated by proper placement. Open areas allow men to work on the windward side.

Wire for motors should be run in conduit and connections to motors made in flexible metal conduit.

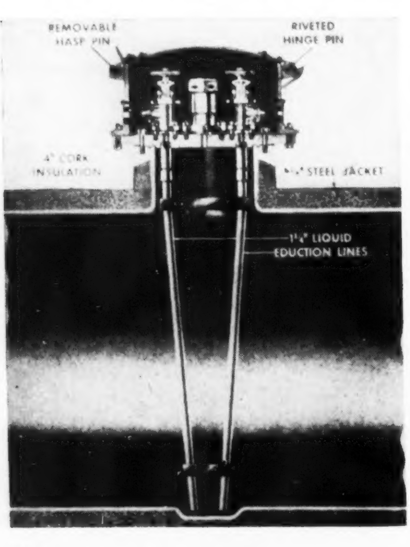
Glass is very readily attacked by HF fumes and will cloud up very quickly. Although plastic (polystyrene) is not perfectly resistant to HF over a period of time, it is superior to glass and is satisfactory as a substitute for glass in gauges and instruments.

After construction has been completed all lines should be pressure tested for leaks before operation begins.

Sketch of top view of tank car dome showing valve arrangement.



Cross section of dome and inner shell.



Safety Practices

As the safe handling of AHF is essential to successful plant operation a study of safety practices is well worth consideration. Our experiences clearly indicate that it can be handled safely.

Although safe handling of any dangerous chemical is largely the function of materials of construction and design, the human element also plays an important part. The selection of personnel should be based on ability to follow orders and obey safety instructions. The men should think straight and act quickly in cases of emergency. They should respect the material they are to handle, but they must not be afraid of it. A man who is afraid of his work is a liability and should be transferred; otherwise he may some day be responsible for injury to himself or others. It should be clearly recognized that certain men are unsuited for work with AHF due to the fact that even slight concentrations of fumes will cause severe nasal and throat irritation. People who sunburn readily usually burn easily from the fumes of AHF and when working where these fumes are apt to be encountered should wear proper protective clothing. Our operators have found that zinc oxide powder applied to exposed skin surfaces minimizes the danger of burning. A special HF ointment containing magnesium oxide may also be used for this purpose.

In the safe handling of AHF, periodic inspection of premises and equipment, including tools and safety appliances, is imperative. Regular inspection of acid lines, valves, pumps and equipment will detect leaks at their beginning, spot potential trouble and avoid costly repairs and injury. It is wise to make sure that tools and safety equipment used by the men are in good order and adequate. Repairmen should be thoroughly familiar with the AHF equipment in use and with methods of repairing it. They should also be familiar with the required use of safety equipment for each job. These men must be reliable and must adhere to prescribed safety rules. Remember always that the safe handling of any dangerous chemical depends upon keeping it confined and off the skin, and all safety practices should be devised with these goals in mind.

All equipment scheduled for repair should be considered full of acid until it has been definitely established as empty. Tanks, pumps, lines and valves that are to be repaired should first be drained, flushed and evacuated. Workmen should never be allowed to attempt repair of equipment while pumps are in operation and the lines full of acid. If pipe sections are to be removed and flanges opened, the lower bolts should be loosened first and, although the lines may have been flushed, care should be taken to avoid any drip. Graphite on threads facilitates removal.

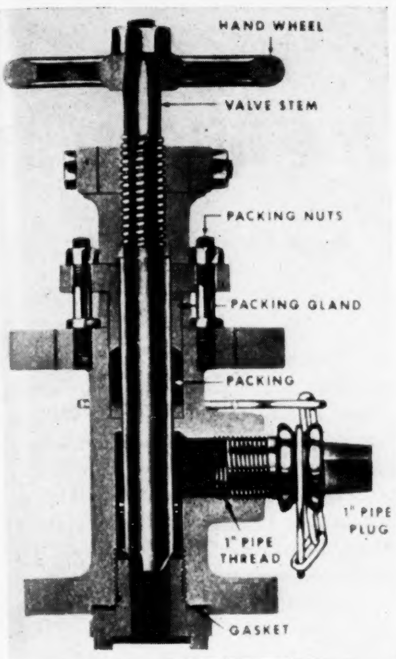
Employees should be instructed never to stand in front of an open acid line or in front of a valve while it is being opened.

If it is necessary to remove sections of lines by cutting with a torch, be doubly sure that the lines have been drained, flushed and evacuated before starting work. Operators engaged in this type of repair work where spatter is possible should wear full protective clothing. The hazard of hydrogen explosion is prevalent when cutting into empty acid lines or empty acid tanks, especially if they contained weak acid. This hazard can be minimized by adding dry ice to the receptacle or line before starting repair work. AHF is not in itself an explosive.

Equipment, such as valves, motors or fittings, removed from acid service should be identified with a distinctive marking and thoroughly washed with an alkaline solution before being handled. All workmen should know the meaning of this marking and should never touch articles of this type with bare hands or without proper protective clothing. We have found that failure to obey this rule is a cause of minor burns.

Each repairman for AHF equipment should be provided with a complete set of tools and should never allow other workmen to handle them. These may at some time be contaminated with acid and men not properly protected with gloves or clothing may be burned. Tools used in acid repair service should be thoroughly neutralized with a solution of soda ash after each use. An effective way to prevent rusting is to dip them in kerosene after washing.

Employees should make a practice of never unduly exposing the skin when working in the acid section and should wear full coverage of clothing at all times. Working bareheaded, with shirt sleeves rolled up or in an undershirt is exceedingly hazardous in an acid plant. Neoprene-soled shoes or rubbers, a hat or protective head covering, face mask or goggles and Neoprene gauntlet-type gloves are indicated at all times. In addition a Neoprene-coated apron is advisable and a complete Neoprene-coated suit should be worn when repairing AHF equipment. Our workmen prefer the



Cross section of tank car valve.

medium weight gauntlet-type glove to the thin glove. The thin glove offers greater freedom but tears more readily and has been the cause of minor burns. Neoprene gloves should be thoroughly washed, inside and outside, and pressure tested for leaks before use. The habit of removing or raising goggles with soiled gloves should be cautioned against, as it is often the cause of burns. We have found the use of a portable blower or fan helpful in whisking away fumes when tightening packing glands on valves.

Acid spilled on the floor must be neutralized immediately with soda ash. Contaminated clothing should be neutralized with bicarbonate of soda and laundered before reuse. Porous materials, such as wood and pipe coverings or packing materials, contaminated with acid should be disposed of by burning or burial.

Service lockers should be supplied for each operator in which to keep equipment used daily and it should be the duty of the foremen to see that this equipment is properly maintained and that replacements are made when necessary. A sink with ample water supply should be provided for cleaning and washing tools. We have found a bottle of Universal Wide Range Indicator very helpful for determining the presence of HF on garments or tools and it can be used to advantage by the inspector to determine if the rule relative to the washing of equipment and tools is being executed. Automatic safety showers should be located near pump houses or areas where maximum repairs may be indicated. These showers must be connected to a plentiful supply of tepid water, and the type of shower which automatically operates an alarm when occupied is preferable. Prompt aid is essential in cases of burns from AHF and the alarm system will indicate that a man needs aid.

You should remember that, while it is necessary to make rules, it is equally necessary to see that they are carefully followed.

First Aid

These comments on first aid are based on our experience and the experience of others in handling AHF. In all cases of injury call a physician familiar with the treatment of hydrofluoric acid burns and use these suggestions only as a means of reducing injury to human beings or mitigating suffering while waiting for the doctor's arrival.

It might be well to preface these remarks on first aid with the old proverb, "An ounce of prevention is worth a pound of cure." A program based on this proverb will not only reduce human suffering but be of immense value to a growing industry. Such a program must be started early because it is based on the following fundamentals:

Equipment design and installation.

Careful inspection and thorough maintenance.

Formulation and strict observance of adequate safety rules.

The three important fundamental steps in first aid for AHF burns are:

Promptness.

Prolonged and thorough flushing with water.

Relaxation and Reassurance.

AHF attacks tissue rapidly and it is important that first aid treatment be given immediately. If a workman is burned with AHF, properly trained first aid crews should be called instantly and respond without delay.

In addition to reacting immediately with the tissue AHF will continue to destroy tissue until it has been removed. The most effective first aid measure is the application of large quantities of tepid water. This will flush the HF from contaminated clothing as well as from the skin and will reduce injury. The treatment we use for AHF burns depends upon the removal of the acid from the tissues by prolonged soaking in water, and several severe burns which we experienced responded excellently to this treatment and recovered fully. The skin after contact with AHF has a peculiar marble-white appearance. After prolonged washing with water and removal of the acid the burned area will assume a natural pinkish color and this is an indication that sufficient flushing has been given. We have found that it is necessary to apply the water for a period of three to five hours for average burns and in the case of a very severe burn water was applied after hospitalization for a total period of nearly twelve hours. Due to the advisability of keeping the patient in a prone position, the water should be applied to the burned area through spray nozzles after the first initial shower flush of five to ten minutes, preferably longer if the patient's condition will allow.

Some authorities state that they have obtained excellent results by the application of a water flush followed by alternate flushing with weak ammonia and water. Others apply a special HF burn ointment, containing magnesium oxide, after the flushing period. Another method reported to be successful is the subcutaneous injection of calcium gluconate solution to precipitate the fluorine ion in an insoluble form. The whole treatment for HF burns is designed to counteract the double action of the acid: the acid action, and the fluorine ion action. It is stated that the fluorine ion must be removed from the tissue to prevent deep-seated, slow-healing sores and it is a matter of opinion as to which method will accomplish this best. At least the methods are all similar in that they require copious flushing with water and if this rule is followed the first aid crew cannot go wrong.

Pain may not be experienced immediately on contact with the acid and in some cases does not occur until several hours later. Thus, workmen may receive burns and go home at the end of their shift without knowing that they have been burned. If they are not familiar with proper treatment they may use home remedies. We have had several cases of very stubborn, hard-to-heal burns following the application of grease or oil base home remedies to the burned area without thorough flushing. Burns under the fingernails come in this classification and may result from long exposure to strong fumes, sometimes experienced by laboratory workers, or from improperly washed or defective gloves. Soaking the burned hand in a basin of cold water for a long period of time will usually give relief and the patient may even receive a full night's sleep by placing the basin alongside the bed. The writer has personally used this method successfully. If these burns are not quickly recognized and soaked in water they may require removal of the nail and prolonged treatment. The calcium gluconate injection may have promise as an alternative method to removal of the nail.

Small concentrations of HF fumes in the atmosphere are easily recognized and usually cause coughing and irritation of the throat. Prolonged exposure to heavy concentrations may cause lung inflammation. We have never experienced any serious accidents due to burns from fumes and can only conceive of an accident of this type happening due to the operator being trapped or becoming unconscious in

a heavily contaminated area. Fresh air, rest, relaxation, including prone position, and reassurance and, in the case of stoppage of breathing, artificial respiration would be naturally indicated pending the arrival of the physician. Workmen entering areas heavily contaminated with fumes should wear full protective clothing, including supplied-air hood-type mask.

Skin burns, resulting in a reddening and soreness of the exposed skin area, sometimes occur from HF fumes and people who sunburn readily are more susceptible than others to burning of the skin. Thorough flushing of the reddened skin area with water, followed by the application of a special soothing alkaline cream will relieve the discomfort. Many of our workmen have formed the habit of heavily applying zinc oxide powder to exposed skin surfaces when working in acid areas and have found it beneficial. We have information that a special protective cream containing magnesium oxide is also very effective for this purpose.

Eye burns are usually the result of a direct splash of acid in the eye and may be avoided if proper protective equipment, such as goggles, mask or face shield, is used as indicated by the safety rules. In case of an actual splash of acid in the eye, the eye should be immediately flushed with large quantities of water. Due to the clamping shut of the eyelids from involuntary muscular action, it is sometimes necessary to forcibly hold the eye open to apply the water. A bubbler fountain is ideal for flushing the injured eye. After the eye has been thoroughly washed, normal saline solution may be applied, but in all cases of eye burns it is good practice to have the man examined by a competent physician specializing in treatment of the eyes. Although fumes from HF may cause the eyes to water, actual burns from moderate exposure to the fumes are rare. The copious flow of tears has a beneficial effect in that it tends to dilute and wash away the acid.

Both preventive measures and first aid can be effectively applied in the acid plant. In the period of two years in which we were pioneering in the production of this new chemical, and during which time we produced approximately a million pounds of AHF, we had only two severe burns, one requiring extended medical attention and the other prolonged hospitalization. No accidents other than minor burns requiring first aid treatment have occurred since. We suffered no fatalities due to results of AHF burns and no permanent disability resulted in any of the accident cases. We feel that an analysis of accidents with subsequent adoption of corrective measures was largely responsible for this record.

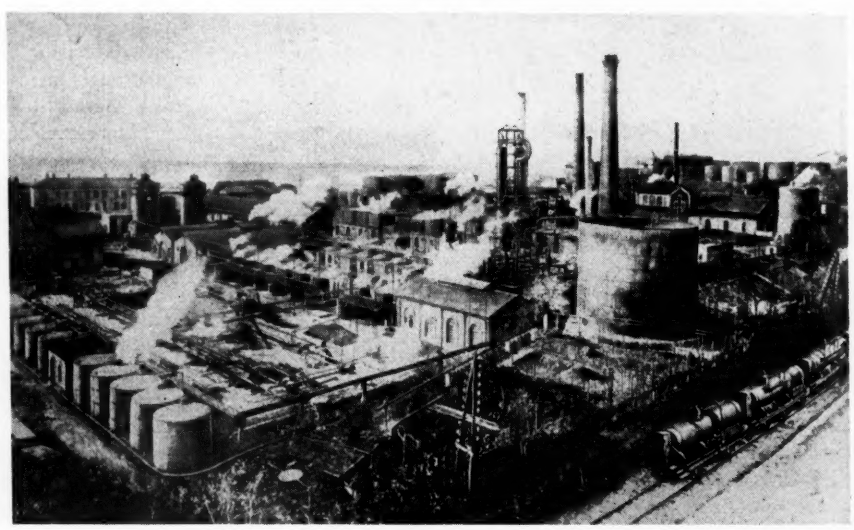
Based on an address delivered before the Western Petroleum Refiners Association, Tulsa, Okla., July 9, 1943.

Italian Chemical

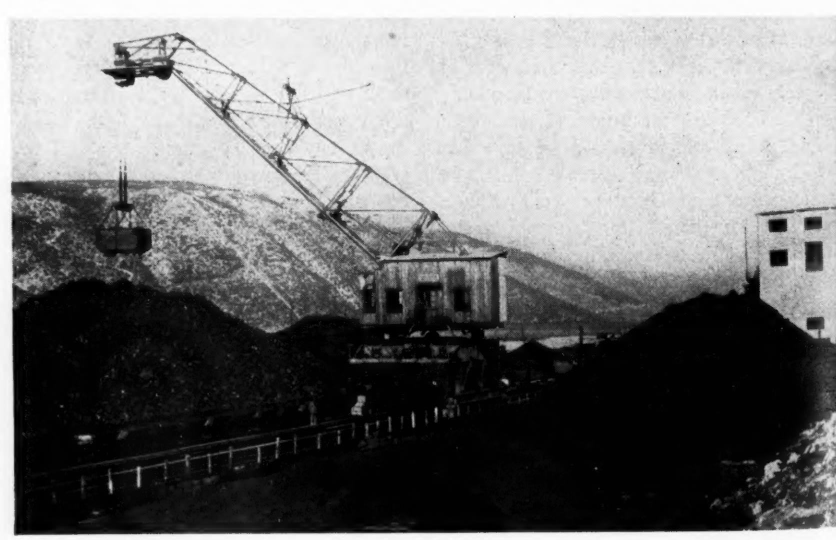
By *T. E. R. Singer*

UNDER present conditions information regarding enemy economic affairs is naturally difficult to obtain. Since the last war Italy has developed a large chemical industry, in addition to being a source of raw materials. In 1937 the country produced over 10.5 per cent of the world's supply of sulfur (shown on the map by S) as compared with the U. S. production of 80 per cent. Italy is the largest producer of mercury (shown on the map by Hg), producing almost half of the world's supply. In 1940 the Italian-Spanish cartel fixed the price at $250.00 per flask of 34.5 kg. Zinc (Zn), Iron (Fe), lead (Pb), bauxite (Al), pyrites (Δ), asbestos (*), molybdenum (Mo), antimony (Sb), and a relatively small amount of coal (C) are also found. The amount of coal is inadequate for Italy's requirements, and large quantities of coal have been imported from Ger-

Oil distillation plant at Fiume.



Coal from the newly developed deposits on the island of Sardinia ready for shipment from the seaport of Carbonia to the Italian mainland.



Resources

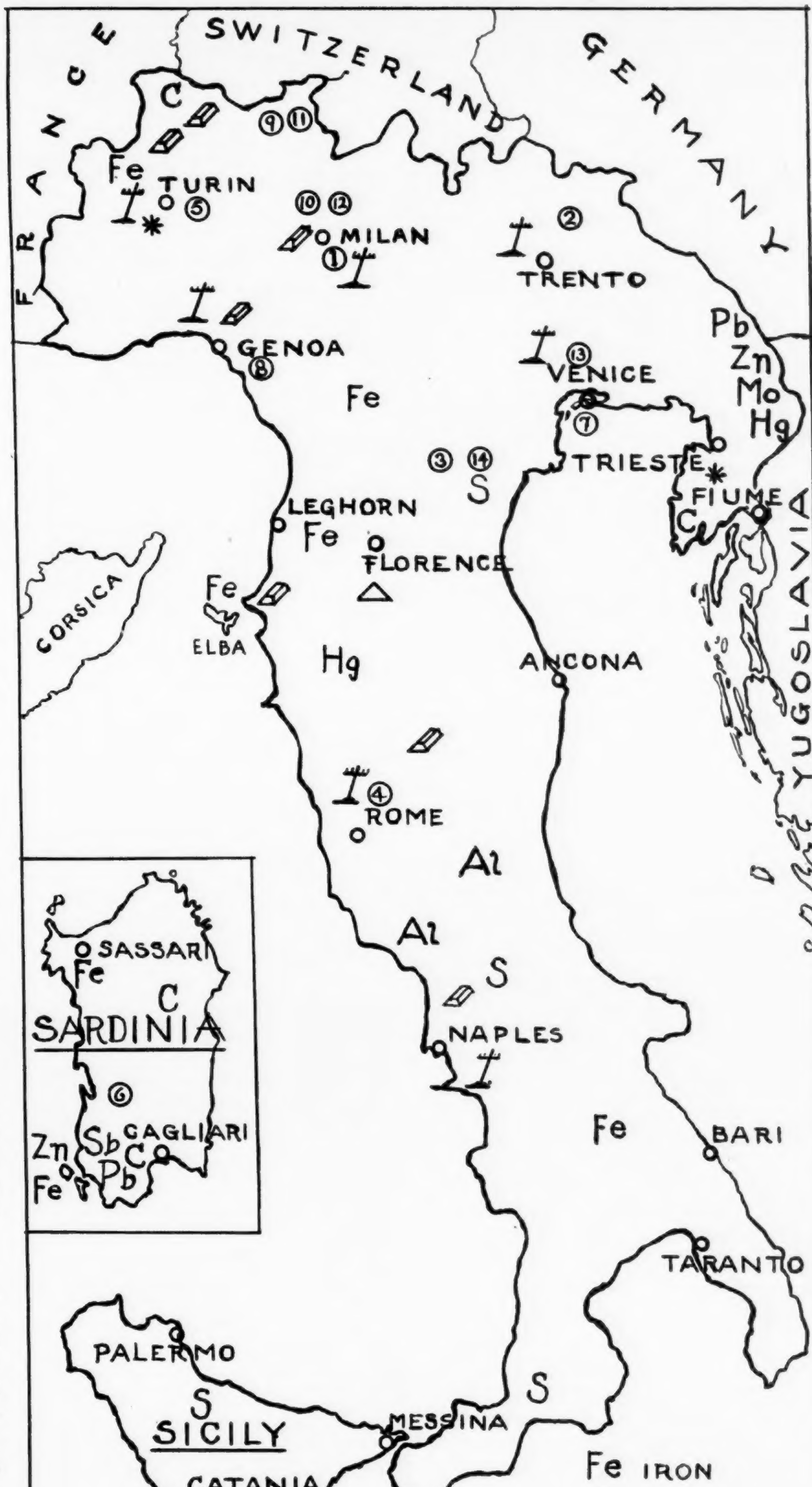
many, as well as steel and potash. However, in 1940 the Soc. Anon. Metallurgica Ossolana of Villadossola was authorized to construct a plant in the province of Mantua, for electric power, with which Italy is plentifully supplied, for the production of 30,000 tons of pig iron and 90,000 tons of steel per year. The need for light metal alloys for airplane construction is shown by the fact that in the same year the Ing. Benedetto Mammano Co., of Milan (1) was authorized to erect a plant for the production of magnesium alloys. The S. A. M. I. S. Co., and the Montecatini Co., have plants in Bolzano (2) for the production of magnesium from dolomite. Aluminum production has also been increased.

Montecatini has expanded its nitrogen fixation facilities, and Ammonia e Derivati Soc. Gen. per i Prodotti Azotati, of Milan, was authorized to construct a plant in the Apuania district (14) for the production of synthetic ammonia, nitric acid, nitrates and sulfates from coke oven gases. In addition the Soc. Lavorazioni Organiche ed Inorganiche S. L. O. I., of Bologna (3) was authorized to increase its electrolytic plant for hydrochloric acid production in Aurelia (4). The Montevecchio subsidiary of Montecatini has increased its lead and zinc capacity in plants at Montevecchio (5), San Gavino, Sardinia (6) and Porto Marghera (7), where the Soc. Lavorazione Leghe Leggere has an aluminum plant.

A new phenol plant has been in operation since the end of 1940 at Cengino (8), and phenolic resins are also being produced. Urea plastics are being made at San Giuseppe Cairo. A vinyl acetate plant has operated since the beginning of 1940 at Villadossola (9) where rubber substitutes are also manufactured. Synthetic rubber, only, is made at Cesano Maderno (10). Polyamide resins are being made at Verbania (11) and Nylon also. The Aziende Colori Nazionali Affini dye works are producing nitrobenzol, aniline, beta naphthol and anthraquinone at Cengio (8) and Cesano (12).

New hydroelectric generating stations are in operation at Alto Adige (13), Rio Valles, and Apuania (14), where calcium carbide is being made by Montecatini.

It is understood that Germany made its technical patents available to Italy.



Fillers in the Plastics Industry

By *Dr. W. C. Gangloff*

Chemical Director, The Drackett Company

THE verb "to fill" and the noun "filler" have been associated with the plastics industry from history's earliest days. If we regard ceramics as one possible branch of plastics, we recall how the ancient Egyptians "filled" their bricks with straw until someone of the New Dealers decided that they should make them without straw. In the modern field of resins and plastics, wherein we may omit from our consideration the glasses, ceramics and rubbers, we may regard a filler as something added in the nature of an extender, for some particular purpose, e. g. to change the density, strength, surface, bulk, weight, electrical properties, viscosity or appearance, or from the processing angle to speed fabrication or reduce costs. In every case their use is definite and carefully worked out.

Plastic fillers may be of an inorganic nature on the one hand, like clay, talc, silica, barium or calcium salts, powdered metals and minerals, etc.; or an organic nature on the other hand; like wood flour, canvas, rag stock, various other fibers, nut shells, etc. Each has its place and its niche is governed by the various factors involved in the processing details and requirements of the finished products.

When the chemurgist first thinks of resins and plastics he may be bewildered. Some contain fillers and some do not. When he comes to realize the great number of resins and plastics which have been developed he begins to see what such fashioning entails. He begins to see that cotton as an agricultural crop is valuable because its cellulose can be nitrated or acetylated. He begins to see that his trees may provide not only lumber but lignin, wood pulp, sawdust, fiber or flour. He begins to see his corn stalks good for something other than winter time cattle feed. His soybeans begin to appear as industrial protein or protein meal of interest in plastics from several angles. His corn becomes something more than hog feed. Since fillers have become such an integral part of so many plastics, we see here another opportunity for agriculture and another example of how modern men of science are teaching progressive men of industry to make wider use of the products of the soil. This is in line with the real purpose of the Farm Chemurgic Council—to survey the variety of farm products which can be transformed into raw materials usable to industry and to promote the tripartite efforts of agriculture, science and industry.

Fillers are always used for a definite purpose even though they may chemically be relatively inert. Limited amounts of inert extenders in the right physical form, do not reduce durability appreciably but of course there is a limit to such addition. In too large amounts a progressive weakening occurs. Some fillers, where it is desired to secure good body, may act as both extenders and adhesives, e.g. dried blood and certain of the proteins. Regardless of whether or not the filler is of organic or inorganic nature, the physical form for admixture to the resin, is very important. Materials like clay, woodflour or powdered metals are usually employed in a size which will pass 200 mesh and in some cases even 300 mesh or finer.

Other materials like cotton string, rayon cords, rope, asbestos, etc., may require a certain fiber length, especially where strength and high impact resistance properties are wanted. Still other formulations can employ flock or stampings. In the newer technique of transfer molding, it has been shown that the right resin-filler mixture is all important as there may be too much tendency for the resin to flow away from the filler and thus produce an end product lacking homogeneity. The voids which result make for weak areas and poor moldings.

Farm crops, like the wheat straw, hemp, and sisal shown, and many other farm and forest products are used as fillers and binders in making plastics.

Mixture of resin and fibers, pre-formed through suction operation, is ready for molding into rear compartment door of experimental plastic automobile.

Furthermore the moisture content of fillers is of much importance, especially if added before or during the resin formation stage. Incorporation of the filler material after the formation of the resin is entirely practical in many cases, but if too much moisture is present there may be blister troubles on molding. In the phenolic materials fillers are especially important as their use makes possible hundreds of formulations for a wide variety of uses. Urea resins usually employ a wood cellulose filler.

A brief sketch of the more important fillers employed in the plastics industry may be of interest to those who are chemurgic minded.

Wood Flour: Wood flour is the most commonly used filler for phenolic resins and plastics. Since it must be used in a very fine state of sub-division, special shredding, grinding, and screening as well as drying is necessary in its processing. Selection of the wood, handling and careful processing are all requisite to a good product which is to serve as raw material. Any old wood, bark, chips, or refuse will not do. Like many other products, wood flour must be carefully tailored.

The commercial grades of wood flour exhibit a low specific gravity. This makes for bulking in molding operations. Wood flour filled plastics have good moldability properties, low heat conductivity, fair surface, take colors well, and exhibit a good appearance. In service the wood filled phenolics shrink considerably and show only a fair impact strength compared to some of the long fiber filled plastics.

Cotton Fillers: Cotton fillers may be fabricated in various forms—wadding, stampings, strings or cuttings. In general they serve well to improve impact strength and impact resistance. Cotton flock has found wide usage in the so-called medium impact strength phenolics, where general purpose molding powders do not serve satisfactorily.

Where pre-forms in molding operations are necessary, cotton-filled molding powders tablet well and hence serve well in high speed large production compression molding. This is of interest for both piece work production and automatic molding. Buffing and polishing is easy on cotton filled stock so that the finished molding presents good appearance.

In impregnation operations, cotton, in the form of layers of canvas laid at various angles in respect to weave, has long been used for the manufacture of gears, etc.

Rag Fillers: Rag fillers are employed in general where something more than medium impact strength or medium impact resistance is desired. Just what increase is secured is of course a matter of the length and type of fiber and how it was processed. If, in cleaning the rags, the fiber strength was appreciably destroyed, one cannot expect good high impact strength molding powders. Any increase in strength secured is at the expense of other properties. Rag filled plastics do not machine too well and their surface finish is notably poor. They do not flow well and frequently in molding operations, the resin tends to flow away from the filler. Transfer molding has helped in maintaining homogeneity and today cotton canvas in fairly large bits is being successfully incorporated in molding powders.

Ramie Fibers: Ramie fibers have found some use in the plastics industry where an increase in strength is desired. War time restrictions of course have cut available supplies.

Chips, Excelsior and Sawdust: Fillers of this type have been used with resins primarily in the fabrication of different types of wall board for building or acoustic purposes. Their use is entirely a matter of economics, standardization and supply. Wood chips for materials like Masonite and Prestwood have long been well known commercially and will play an increasing role in house fabrication in post war days.

Vegetable Proteins: While soybean protein plastics employing the isolated protein have been prepared of the phenolic and urea types, by far the largest production so far has been through the protein-containing soybean meal. Here it serves not only as a filler or extender but in part as a reactant as well, inasmuch as the protein combines with aldehydes. In similar fashion the residual meal left after scalping out some protein may be employed to serve as both filler and reactant. Flow properties can be increased by judicious use of soybean meals in preparing modified phenolics.

Plastics employing cottonseed meal and peanut meal have been made analagously but as yet have not been developed in a large way.

Animal Hair Filler: For many years the use of hair fillers for plaster was widespread. It was not surprising that this material was tried in some plastic compositions, primarily for imparting strength, but its use has always been limited. Insect and vermin infestation of raw material causes a problem.

Redwood Fillers: Redwood has found application in the plastics industry in the form of flour and as pulp. In addition, like bagasse, redwood tannins and phlobaphenes can produce a resin of themselves. With other agents this resin can produce useful molding powders.

The large amount of redwood stumps available lends itself to further chemurgic exploitation.

Sisal Fillers: Sisal fillers are of interest due to fiber strength. Most of this material must come from distant foreign shores and during the past few years has not been available in sufficient quantity to find great usage in plastics. However, it has good possibilities and should not be forgotten in post war days.

Ramie Fillers: Like sisal, ramie fillers have not been available in quantity during war times and their use in plastics has necessarily been relatively small.

Asbestos Fillers: Many plastic compositions fall short because of their inability to stand heat where resistance is the primary factor of importance in the molded part, asbestos fiber is employed, particularly with phenolics.

Asbestos is a mined product and there must be careful grading for proper fiber length and freedom from other impurities. At best, asbestos fibers have a relatively high specific gravity. This lowers the bulking value of such molding powders. While the molding operations are slowed up to slow flow, good surfaces exhibiting good resistance to water and most acids are obtained.

Mica Fillers: Mica ores in the form of schists have long been known. Our forefathers used good old base burners in which mica windows were fabricated. However the unusually good dielectric properties of mica led to its more practical use in the electrical industry. It has now found a good place in molding compositions.

The crude ore treatment embraces grinding, froth flotation, leaching and purification of the separated mica, washing and drying. For molding compositions further fine grinding is done and the milled product then incorporated with appropriate resins. Corrosion resistance and low water absorption are characteristic. When phenolic resins are used the power losses are not unduly excessive. However the machinability of mica filled plastics leaves much to be desired. Many are very brittle and cause much difficulty in such operations as drilling due to the inherent characteristics of the mica itself.

Silica Fillers: Like asbestos, silica fillers show high heat resistance, high insulation, etc., but have the big disadvantage of high specific weight.

Various clays whose essential makeup is some form of silica have found some use in the plastics industry. Mineralite and aluminum silicate, has found successful application during the exigencies of present war-time.

Diatomaceous earths—the diatom skeletons of small marine animals—are silicious in character and have been used as fillers considerably in recent years, for certain grades of plastics. They exhibit a low specific gravity and yield moldings having fair electrical properties and fairly low water absorption.

"Fiberglass" derived from silica sand, limestone and mineral ingredients has found effective use in conjunction with plastic resins, especially where high temperature requirements are in the forefront. This has become of great interest in building electric motors.

Talc Fillers: Talc is a magnesium silicate which has recently been developed from the plastics use of steatite into a post war Pacific coast industry.

Partly because of the nature of the material, which we have known chiefly as a base for cosmetic powders and partly because of the process of manufacture and to the high degree of quality, uniformity and accuracy required in finished electrical and radio products, the production of plastic insulators, etc., from steatite is very intricate and difficult. The talc which goes into steatite must be thoroughly ground, washed and screened and then purified from any trace of contaminating iron which would detract from its insulating or other required properties.

In general, talc is used as a filler in plastics for its excellent lubricating properties.

In insulators and similar electrical products, the talc is mixed with other constituents and processed so that it can be die-pressed, extruded or cast. The wet mix must be machined to rigid specifications and then baked for hours at 2200 to 2600 deg. F. Temperature control within 15 degrees is necessary to avoid shrinkages without the narrow tolerances of as little as two thousandths of an inch.

Steatite cases for holding radio transmitter crystals are a fine recent development. Crystals, cut from quartz, are thin glass-like wafers, and have been called "the beating heart of the transmitter." They control the frequency of current by which sound is transmitted by expanding and contracting under electrical stimulation. In order to perform properly, these quartz crystals, some of which are about the size and thickness of a postage stamp, must be held between pieces of metals, called electrodes, and encased in containers having high protective and insulating qualities. These crystal holders developed from talc, have served well for many of the transmitters at ground stations for air bases.

Here we have another shining example of the development of one of our natural resources. Every clay bank is not a source of high grade talc but who knows what might be developed from them if chemurgic minds became really curious and inquiring?

Barium Sulfate Fillers: The place of blanc fixe in the paper and paint industry has long been known. In plastics where chemical resistance is a requirement, the use of barium sulfate has served to some extent. It is extremely heavy and must compete with the other bulkier inorganic fillers.

Titanium Oxide Fillers: Some use of titanium oxide as a plastics filler occurred in pre-war days but not in large amounts. Restrictions on this material have curtailed its use.

Zinc Oxide Fillers: During the war, the use of zinc oxide as a plastic filler has of course been curtailed. In the ureas and similar types of plastics zinc oxide has been well received. It has found some use mixed with other inorganic fillers like lithopone, barium and calcium salts and titanium oxide.

Bagasse Fillers: Bagasse, the residue remaining after the extraction of the juice from sugar cane, has been developed for use in making laminated materials and also more recently, semi-thermoplastic molding compound. To date production has been limited, both of the inherent bagasse resin and of the product obtained by mixing bagasse fiber with the bagasse resin. The latter mixture is claimed to be preferable to that obtained when using wood flour as filler with the bagasse resin.

Walnut Shell Fillers: Walnut shell flour is characterized by its great uniformity after milling. This material is one of the so-called "hard fillers." It possesses the property of high absorption but itself is almost entirely non-absorbent. About one-third of its weight in dry form is due to lignin and cutin. The latter constituent, important in nature's way of preventing moisture evaporation, is not present in wood flour.

More than twenty different kinds of walnut shells are ground into the filler flour. This represents a typical chemurgic development—making waste material over into useful plastics which exhibit great stability, unusually smooth and lustrous surfaces on moldings, high heat and moisture resistance as well as high dielectric strength. Although the talc comes from California, it is said walnut shells do not deteriorate by weathering and can lie underground for years without deterioration. Maybe some day some up and hustling chemurgist will develop plastic pipes containing walnut flour which will outlast the famed aqueducts of ancient Rome.

Graphite Fillers: Graphite is an amorphous form of carbon. It has a sort of greasy characteristic which lends itself for lubricant properties. It is generally used in combination with other fillers like asbestos, wood flour, diatomaceous earths, rag stocks, etc. The molding properties of such molding powders rate well, the resistance to acid is good, and the water absorption values fair. However, heat conductivity is poor. The prosaic caster wheel, certain machine bearings, door slides, etc., have all been successfully engineered from phenolics using graphite as part filler.

There are of course many other possible fillers of both the organic and inorganic type. Each has its economic place in a shifting chemical age and eventually must find its competitive niche in an advancing industry.

Fillers may appear to be prosaic materials but they are important ones. In the worthwhile scheme of advancing the American standards of living, chemurgists may well look upon fillers in plastics as a field in which there is opportunity—opportunity for agricultural profit, and opportunity for good cooperative service in technical endeavor.

Based on a paper "Plastic Fillers" presented by the author at the Fourth Mid-American Chemurgic Conference, Cincinnati, September 29, 1943.

Fused quartz provides an unusually flat surface. These 10" blanks were accurately finished to give a surface variation of no more than 0.0000004".

FUSED QUARTZ—
A Growing Engineering Material

By W. M. Johnson

Service Engineer, General Electric Company

Shortages of strategic materials have led to increased interest in fused quartz as an engineering material. Hard, strong, workable, resistant to temperature change and most corrosion, it is performing some new and remarkable war jobs.

PRODUCTION of fused quartz doubled in 1941, doubled again in 1942. The reason was the large number of new applications for this unique material developed by chemical, electronic and production design engineers.

Fused quartz is truly one of the most remarkable materials available to engineers and scientists, and it is only comparatively recently that sufficient has been known about it to indicate the breadth of its possibilities. For instance, it has a coefficient of expansion that is but one-seventh that of glass and far lower than any type of steel, lower in fact than that of any other known material. It has unique optical properties that the National Bureau of Standards early discovered and put to good use. It is unusually transparent and has the highest transmission of ultra violet of all known material except crystal quartz and fluorite. Neither of the two latter materials lend themselves to commercial fabrication in functional shapes. Quartz has the ability to transmit light in a very wide range of wave lengths, starting below 1,850 angstroms in the ultra violet and going through the visible spectrum and the infra red to over 40,000 angstroms. This quality makes it particularly useful in therapeutic work and in processes such as the irradiation of food products.

Orthodox gage blocks are subject to expansion which affects calibration. Quartz block and ring gages for go and no-go measurements were found to have real advantages. With gages of fused quartz, it was possible to measure both sides of a processed part simultaneously to determine parallelism. Fused quartz fibers can be spun to a fineness of 0.0001 in. in diameter, which makes them suitable for cross hairs on scientific and military instruments. It has been used to develop surface mirrors for many accurate military and optical instruments. Using an accurate quartz base plate, fused quartz optical flats can be mounted so that surface tension alone will hold them in exact calibration.

Quartz is one of the many forms of silicon dioxide, SiO_2. The commonest of all of the minerals on the face of the earth, it is present wherever there is sand. There is a great deal of difference between fused quartz and its close relative quartz crystal. Fused quartz never gets below semi-fluid in any process of heat treatment. General Electric Laboratories

Held without discomfort in the hand, a fused quartz rod carries enough heat from a furnace to light a cigarette.

are producing rods, tubes and ingots of fused quartz for fabrication. The ingot cost of the material has come down over years from $35.00/lb. to less than $10.00.

Electrical Properties

The first obvious and natural interest of General Electric scientists in fused quartz was concerned with its unique electrical properties. Early tests revealed that it had high resistivity and low dielectric losses particularly at high temperatures where losses are usually greatest. Fused quartz had the ability to withstand wide and sudden temperature changes which made it superior to glass and porcelain for many electrical insulators. It had a dielectric constant of about 4.4 at 100,000 cycles at 25° C. and 60% humidity. Its dielectric loss was about one-eighth of wet processed porcelain and its phase difference was less than 20 seconds at 1,000 cycles. It had a high resistivity, greater than 10^{19} ohms per sq. cm. at 500 volts and 25° C. It proved to have less affinity for moisture than any other material tested. Consequently, its surface leakage was very small as compared with glass, porcelain and similar insulating materials. These properties suggested the early use of fused quartz for insulation on high-voltage circuits, and its application proved both satisfactory and successful.

Mechanical Strength

Fused quartz has unusual mechanical strength. Its compression strength is approximately 190,000 pounds per square inch and its tensile strength approximately 7,000 pounds per square inch. The modulus of elasticity in compression has been projected to approximately 9,400,000 pounds per square inch. Its hardness on the Mohs' scale was 4.9 for fused quartz against 6.3 for rock crystal. It is superior to some accepted plastics because of its resistance to scratching and weathering. Its great resiliency has made it possible for fibers of fused quartz to render excellent service as a means of suspension for galvanometer mirrors. Its fibers untwist completely after being twisted through a large angle and bring the instrument indicia back to zero within a reasonably short time after they have been deflected.

Coefficient of Expansion

The coefficient of expansion of fused quartz is lower than that of any known material over a wide range of temperatures. Its coefficient of expansion is one-thirty-fourth that of copper, one-seventeenth of platinum, one-seventh of hard borosilicate glass and one-ninth of tungsten. Its low co-efficient of expansion has suggested a number of uses for the material, such as in standard angles, as standards of length, and as standards in the optical trade for flats, lenses and reflecting surfaces. Scientists in the National Bureau of Standards have been able to finish optical flats as large as ten inches in diameter by one and one-half inches in thickness, and have found surfaces of these discs do not depart more than one-fiftieth of the yellow light wave length from the true plane. This means a departure of only four ten-millionths of an inch from the perfect plane.

Perhaps the most difficult test to which the material has been put is its use in condenser lenses to gather light from high-intensity carbon arcs placed only a few inches from the surface of the lens. Because of the proximity of the arc to the center of the lens, the temperature gradient from the center to the edge is extremely high. In the case of glass lenses, strains are set up which often cause excessive breakage, particularly true when a draft of air strikes the lens or when it becomes pitted by molten material from the arc. This service has been met by quartz lenses and even though they may be pitted after considerable use, they can readily be resurfaced.

Melting Point

Fused quartz has no definite melting point in degrees but becomes thoroughly ductile at approximately 1756° C. It is very refractory and even when heated to its melting point still remains viscous. It may be used continuously at working temperature in the neighborhood of 1000° C. and intermittently at even higher temperatures. Today it has commercial applications, on intermittent service, at temperatures as high as 1260° C. Since devitrification takes place with increasing rapidity above this temperature, the material is not recommended for steady working temperatures at much above 1000° C.

Chemical Properties

Fused quartz is chemically resistant to all substances except alkalies and hydrofluoric and hot phosphoric acids. It is an amorphous material of vitreous structure, requiring no added ceramic or other binder. It is not attacked by any acids, with the exception of hydrofluoric acid at all temperatures and phosphoric at temperatures at or above 150° C. Phosphoric acid affects the material to a lesser extent than it does glass and ceramic materials. Hydrofluoric acid apparently does not react as readily with fused quartz as with most types of glass. Alkaline solutions attack quartz slowly at room temperatures and more rapidly at higher temperatures and higher concentrations.

These characteristics of fused quartz indicate its versatiliy as a tool of science and industry. Research to date seems to justify its further study for new industrial applications.

Low coefficient of expansion, high melting point, and resistance to acids make fused quartz a good material for laboratory ware.

Headliners in the News

British Chemists Visit Hercules

Research developments in plastics, insecticides, and explosives brought two noted British scientists to the Experiment Station laboratories of Hercules Powder Company recently. Representing the Ministries of Production and Supply, Sir Robert Robinson, who in peacetime was professor of organic chemistry at Oxford, and Dr. I. M. Heilbron, who was professor of organic chemistry at the University of London, are shown here with J. Leroy Bennett of Hercules, president of the American Institute of Chemical Engineers. Left to right: Sir Robert Robinson, Lt. Com. J. Fell-Clark of the British Navy, Mr. Bennett, and Dr. Heilbron.

G. Fred Hogg, formerly manager of the Naval Stores Department office in Chicago, has been appointed sales director of the Naval Stores Department of Hercules Powder Co.

Samuel G. Baker has been appointed Director of the Electroplating Division of E. I. duPont de Nemours & Co. He had been Director of Sales of the Explosives Department.

Charles B. McCoy has been named Director of Sales of the Explosives Division of E. I. duPont de Nemours & Co. He was Director of Chemical and Miscellaneous Sales.

Charles W. Rippie has been appointed Supervisor of Technical Service of the Diamond Alkali Co. He will make his headquarters in Painesville, Ohio.

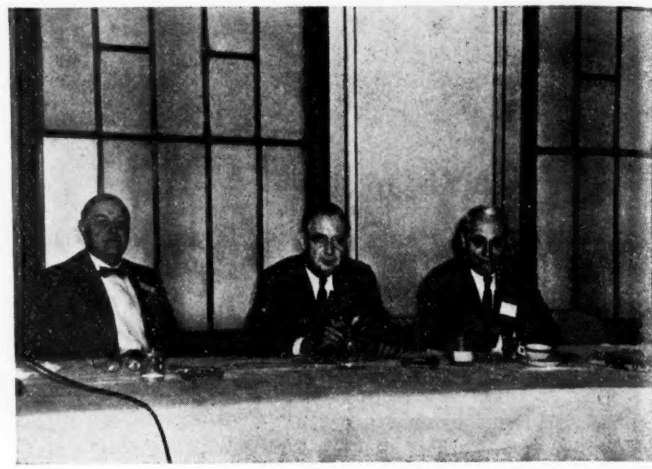
Charles W. Carvin has been appointed vice-president in charge of sales of Industrial Rayon Corp. to succeed George F. Brooks, who is now a partner in Empire State Mills, Inc.

E. Way Highsmith, formerly assistant general counsel, has been appointed general counsel of Hercules Powder Co., replacing John A. Graves who has retired because of ill health.

Mid-American Chemurgic Conference

The National Farm Chemurgic Council, whose aim it is "To advance the Industrial Use of American Farm Products Through Applied Science", held its fourth Mid-American Chemurgic Conference of Agriculture, Industry and Science at Cincinnati, Ohio, September 29-30. For a report of the meeting see page 494. Some of the personalities who attended are shown on this page.

At the right: John W. Ticknor, assistant to the president of the National Farm Chemurgic Council; H. H. Hampton, vice-president, Nickel Plate Road; and B. L. West, vice-president, Cussins and Fearn Co.



Ernest L. Little, Managing Director of the Farm Chemurgic Council and Editor of the Chemurgic Digest with M. F. Taggart, Director of Research of the O'Brien Varnish Co., who presented a talk on, "Camouflaged and Blackout Paints".

Andrew J. Snyder of Reichhold Chemicals, Inc., who presented paper on "Rubber from Soybeans", is shown with Dr. Chester H. Allen of the Hilton-Davis Company, who spoke on "Printing Inks from a Chemurgic Angle." See page 502 for article.

Arthur Huntington of the Iowa Electric Light and Power Company, who presided at the General Session of the Wednesday meeting and Harold W. Derry, Secretary of the Oregon State Committee of the Farm Chemurgic Council.

A group of interested visitors looking at the samples of plastic fillers discussed in a talk by Dr. W. C. Gangloff, Chemical Director of The Drackett Company. Dr. G. M. Hocking of the S. B. Penick Company, who presented a paper on "American Crude Drugs" is second from the left.

"Soybean" Johnson of the Ralston Purina Company, who presided at the Soybean Round Table is shown with Eldred A. Cayce and L. M. Robinson, also of the Ralston Purina Company and J. F. Benham of the Pennsylvania Railroad, three of the interested attendants.

TAPPI Sponsors Army-Navy Conference

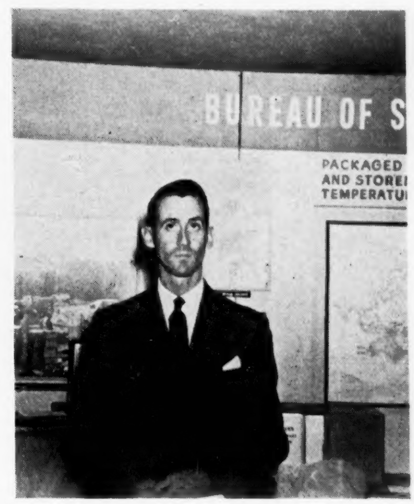
The Technical Association of the Pulp and Paper Industry sponsored an Army and Navy Paper Requirements Conference and Exhibit in Chicago, September 21-24, 1943.

Consisting of a number of technical sessions, meetings and exhibits, the conference was held primarily for the benefit of the Armed Forces who wished to take advantage of the opportunity to discuss its packaging and container problems. Of great interest were the exhibits prepared by the War Department to display packages and to demonstrate proper packaging methods. A portion of the exhibit space is shown at the left.

James D. Studley, Office of the Surgeon General., who spoke on "An Analysis of Medical Department Packaging Problems Offering Opportunities for Technical Improvement of Paper Packaging Materials."

Major Robert R. Melson, Quartermaster Corps, Subsistence Research Laboratory, addressed the U. S. Army session on the subject, "What the Quartermaster Corps Expects from Paper Products."

Frederick G. Barber, Containers Section of the Office of Procurement and Materials, Navy Department, discussed "Paper and Container Conservation and Reclamation within the Navy Department."

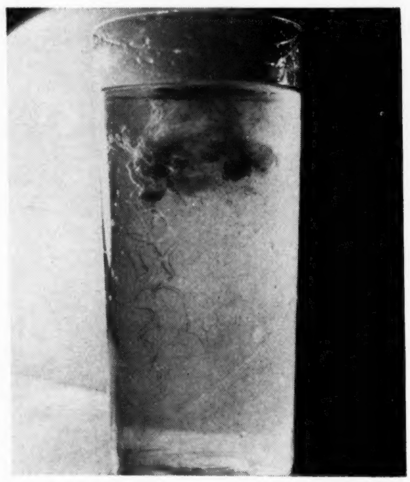


Seated at the head table of one of the gatherings are, left to right: Grover Keith, Marathon Paper Co.; Vance P. Edwardes, International Paper Co.; Col. Robert R. McCormick, Publisher of the Chicago Tribune; Walter Daly, Watab Paper Co.; R. A. Hayward, Kalamazoo Vegetable Parchment Co.; and George Mead, Chairman, Mead Corporation, Chillicothe, Ohio.

At the speakers' table of the Thursday luncheon meeting, left to right: P. J. Massey, H. P. Smith Paper Co.; A. E. Giegenack, Public Printer of the U. S.; A. E. Montgomery, J. O. Ross Engineering Corp. and General Chairman of TAPPI Convention Committee; W. V. Cassiday, U. S. Government Printing Office; Walter Daley, Watab Paper Co.; and R. H. Herrell, U. S. Government Printing Office.

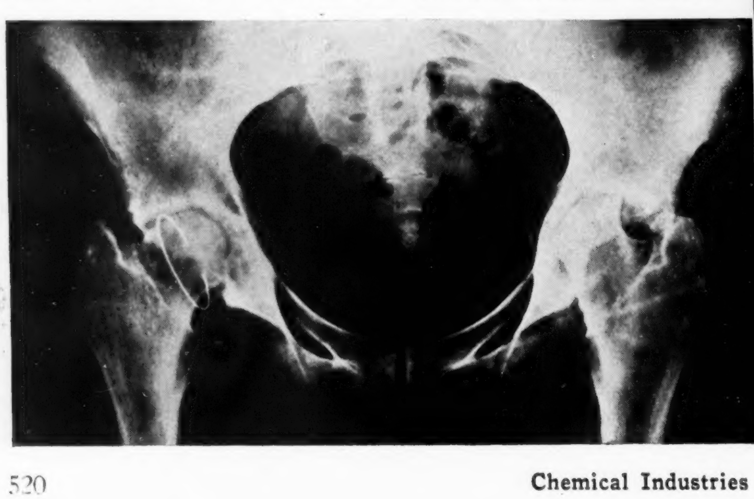
Chemist Cited for War Contribution Raphael L. Stern of the Hercules Powder Co. has won the Army Ordnance Department's coveted Citation of Merit for his chemical research that has resulted in increased smokeless powder production. Stern, Chemical Superintendent of Hercules' Parlin, N. J., plant, adapted wood pulp for powder manufacture, relieving shortage of cotton and lowering cost of American powder output by about $20,000,000 this year. Col. G. I. Ross Commanding Officer, New York Ordnance District, presents citation.

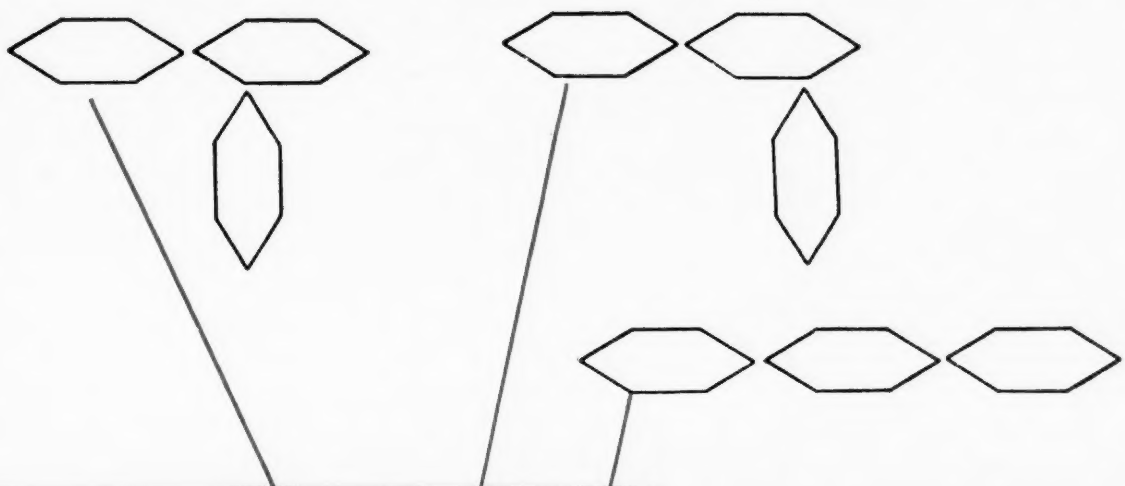
Dyes to the Rescue Chemists on the home front have contributed another development to aid the armed forces, by developing a dye that lights up the water of the ocean with a huge yellow fluorescent yellow patch and thus enables searching planes to find airmen who are forced down over the ocean. Developed by the Calco Chemical Division of the American Cyanamid Co. in conjunction with the Army and Navy, the life jacket "dye marker" is shown at the left. The tiny package when the rip flap is pulled creates a spot visible ten miles at a height of ten thousand feet. Instead of forming just a surface slick which is easily dissipated by waves the dye forms a patch which has considerable depth and therefore has a life of about three hours. The center picture demonstrates the quick downward penetration of the dye. At the right, a life boat approaches a downed flyer in the center of the colored patch which has attracted the attention of a searching plane.



Plastics take Pain out of Arthritis A new wrinkle in the surgical treatment of painful arthritis has been found in the insertion of Plexiglas cups in affected joints. These transparent Plexiglas cups, for the first time permit surgeons to follow the progress of a case through X-rays after operation. Used in a new method for treating arthritis, surgical insertion of these cups relieves the pain of arthritis and also preserves motion in the treated parts.

The old surgical treatment relieved pain by making afflicted joints immovable. Patients were left therefore with a choice of two evils. Now, by removing excess growth on the bone head, the cause of arthritic pain, and capping the head with a Plexiglas cup—a relatively simple operative technique—painless motion is restored.





PROPERTIES OF TERPHENYLS

	Mixed Isomeric Terphenyls	ORTHO	META	PARA
Color (NPA)	4–5	< 3.0	2.2–4.2	0–1.25
Density (g./cc.)	1.133	1.14	1.164	1.236
Melting Point				
Begins to soften	60° C	35° C	75° C	200° C
Completely liquid	140° C	56° C	85° C	215° C
Solidification				
First crystals	60–65° C	——	< 90° C	209–213° C
Hold point	140–145° C	< 54° C	83–85° C	——
Distillation Range D-20 (Corr.)	364–418° C	330–350° C	370–378° C	381–388° C
Flash point	191° C	171° C	207° C	207° C
Flame point	238° C	193° C	229° C	238° C
Viscosity at 210° F (Saybolt Univ. Sec.)	——	40	39.3	29
Electrical properties				
Dielectric constant	2.58	2.54	2.62	——
Resistivity (ohm/cm3)				
100° C	140,000x10⁹	8,200x10⁹	2,600x10⁹	——
155° C	550x10⁹	——	——	——
250° C	——	——	——	30x10⁹

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The Terphenyls have only recently been made available commercially. They are offered as a mixture and as relatively pure individual isomers . . . at prices which may make it well worth your while to investigate their possible usefulness in your products or processes.

As high molecular weight aromatic hydrocarbons they open up new opportunities for chemical synthesis in the fields of dyes, drugs and organic chemicals. They may be halogenated, sulfonated or nitrated, and the sulfonates may be hydroxylated in the manner usual for aromatic radicals. Aliphatic radicals may be added by Friedel-Crafts reaction.

For experimental samples and further technical data, mail the coupon below. MONSANTO CHEMICAL COMPANY, Phosphate Division, St. Louis 4, Missouri.

"E" FOR EXCELLENCE – The Army-Navy "E" burgee with two stars, "representing recognition by the Army and the Navy of especially meritorious production of war materials" over a two-year period, flies over Monsanto's executive offices in St. Louis and over Monsanto plants at Anniston, Ala., and Monsanto, Tenn. The Army-Navy Production Award also has been won by five Monsanto plants at St. Louis, Mo., Monsanto, Ill., Karnack, Texas, and Springfield, Mass.

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NEW PRODUCTS AND PROCESSES

By James M. Crowe

Fire Fighting Chemicals

The modern trend in the use of chemicals for the control of fire emphasizes prevention rather than fire fighting, according to a recent statement by H. L. Miner, manager of the Du Pont Company's Safety & Fire Protection Division and past president of the National Fire Protection Association.

Mr. Miner, in connection with Fire Prevention Week, pointed to recent accomplishments of research in flameproofing everyday materials. Paper, cloth and wood now can be chemically treated to make them incapable of spreading flames. Mr. Miner said that there is, however, a wide gap between the present availability and use of fire retardant chemicals, and recommended year around public education through the press to close this gap.

He pointed out that lumber is now being fabricated in large quantities, chemically made so fire retardant that it is classified on a combustibility scale closer to asbestos than to ordinary wood. A recent Underwriters' Laboratories report on this new type of building material states that fire resistance is achieved in proportion to the amount of the chemical—chromated zinc chloride—deposited in the wood.

Millions of board feet so processed have been used in the construction of plants, warehouses, and even ordnance works. Fire-resistant lumber is produced nationally by fifty-odd commercial treatment companies. Chromated zinc chloride is forced into the wood fibers under pressure in chambers some of which are large enough to accommodate long trains of narrow-gauge tram cars.

"Practically all kinds of cloth, including the sheerest fabrics, may now be chemically flameproofed," Mr. Miner said. "Treatment is so effective that it is impossible to set textiles or paper on fire. In fact, no after-glow occurs following the use of a new retardant based on ammonium sulfamate. Today production is almost entirely devoted to protective garments for the armed forces and for war workers. It will render great service in safeguarding life and property in peacetime."

Fires in flimsy curtains or upholstery in the home, or in combustible decorations and hangings in public places can be prevented. Children's clothing, bath and lounging robes, household linens, upholstery, and stage scenery can easily be made totally fire resistant by spraying or dipping. Mr. Miner predicted that laundries and dry-cleaning establishments will offer a flameproofing service after the war.

"Research work is in progress in our laboratories to produce fire retardants of a permanent nature," he said. "It is no longer necessary, to retreat frequently except after laundering, nor need retardants alter the appearance or stiffen fabrics. But retardants that are sufficiently economical and available today to warrant wide usage still are soluble in water. We hope to have better ways of transforming the inherently flammable nature of those many common things that supply the kindling for destructive fires in industry, in public places, and at home."

Fatty Acid Derivatives

Emery Industries, Inc. has announced recently the availability of two new and unusual derivatives of animal fatty acids.

The first of these, Azelaic Acid, is described as a dibasic aliphatic acid, having a nine-carbon chain with carboxyl groups at each end. Its melting point is given as 96 deg. C. Several examples of its reactions are given, laying emphasis upon its ability to form soft alkyd resins with glycerine and other suitable polyhydric alcohols. It is said that in general, the esters of Azelaic Acid have higher boiling points than those of fatty acids of corresponding molecular weights. This characteristic is pointed to as suggesting their use as plasticizers.

The second development is described as a series of low molecular weight, monobasic acids, in which the unusual nine carbon acid, Pelargonic, predominates. The properties of this acid are described along with many of its characteristic reactions. Again the esters are described in detail because of their application to the oil modification of alkyd resins with which it is said, they are quite compatible.

Metal Testing Method

A new electronic means of checking and sorting metals for depth of case-hardening and other metallurgical factors, has been developed by Allen B. du Mont Laboratories, Inc.

The new device is based on the use of the Du Mont Cyclograph, a cathode-ray instrument which provides visual means unknown metallurgical items, as well as automatic sorting.

The cyclograph, by the use of several frequencies, either one after the other or simultaneously, checks or compares known and unknown metal pieces according to such factors as case depth, depth of decarburization, amount of cold-working, brittleness, (stress gradients), hardness gradients, structure, etc. Used as a sorting means, the Cyclograph distinguishes according to analysis, heat-treatment, structure, size, wall thickness of tubing, and thickness of plating or cladding, whether magnetic or non-magnetic provided all other variables are reasonably constant.

Floor Patch

Emeri-Crete, a new development of the Walter Maguire Company, Inc., is intended primarily for use in filling cracks, small depressions, ruts, or other imperfections and inequalities in concrete or cement floors. It was developed to meet a demand for a ready-mixed material which could be applied immediately after water has been added.

Emeri-Crete is composed of the same emery that comprises Cortland Emery Aggregate, which has been used successfully in industry for resurfacing old floors and for topping new concrete floors. However, in Emeri-Crete, only the smaller particles of emery are used. They are mixed with a special quick-setting binder which permits use of the floor in six or seven hours after the repair has been made.

Laminated Plastic Board

G. H. Brother of the Bureau of Engineering and Chemistry of the U. S. Department of Agriculture has reported that sheets of unsized kraft paper may be soaked in a water suspension of soybean protein and after drying may be stacked and subjected to heat and hydraulic pressure to produce a laminated plastic board suitable for uses formerly required of phenolic resin laminations. The low water resistance of the resultant board created a problem, but single sheets of the more waterproof phenolic resin placed on top and bottom appear to have solved this use requirement. Pressing time for the soybean protein phenolic board is about one-fifth that required for phenolic resin board.

New Metal Coating

The Pemco Corporation, formerly known as the Porcelain Enamel and Manufacturing Co., has announced the marketing of a new coating for metal under the name "Poroseal."

The new product has been under test for the past two years in the laboratories of the company as well as in the field. One of the unusual features of this new non-organic coating is the broad range of colors in which it is available. While the five basic colors—white, brown gray, olive drab and blue—may be sufficient for the average requirements, it is said that Poroseal may be used to match almost any color of the rainbow without detracting from its other properties.

The product is said to be an entirely non-organic finish, not to be confused with paint, lacquer or similar materials.

It is resistant to corrosion, acids, solvents, heat and abrasion and is non-toxic, homogenous and odorless. The Pemco Corp. is recommending it to industries and manufacturers who are interested in the conservation of the more critical materials and the substitution of surface-treated steel for the harder to obtain corrosion resistant metals.

Oils from Fruit Seeds

Production of oil from fruit kernels is being developed on a large scale in Roumania, according to *Chemische Technik*. Three thousand "wagons" of oil are to be produced from 40 million kilograms of grape seed. Pumpkin seeds, melon seeds, tomato seeds and plum pits are also being used as sources of oil in that country according to the report.

Emulsified Asphalt

American Bitumels Co., is now making an emulsified asphalt called Bitusize B for use in internal sizing of shipping containers. The material is admixed with the fiber stocks being furnished to the filler vats on cylinder machines. Added to beaters, it is subsequently precipitated with alum without need of special equipment. Dry bursting strength is claimed to be fully preserved after 24 hr. of water immersion. Certain paper boards can be made with from 10-15% wet bursting strength loss, after 24 hr. immersion. Bitusize A 3, another grade of asphalt emulsion may be used as an extender for the present critical starch-urea resin weatherproof adhesives, providing improved waterproofness on the glue line, with decreased amounts of starch and urea-resin.

Grinding Medium

Quaker Chemical Products Corp. has developed a new product called Micro-grind No. 132. It is a dark, heavy bodied liquid that when mixed with water in proportions ranging from one part to three parts up to one part with seventy-five parts makes a translucent, permanent solution. It is stable in hard or soft water and can be used in all grinding, honing, lapping or super-finishing operations. The company claims that it completely eliminates glazing and loading of abrasives; prevents recirculation of chips; is non-injurious to skin and to metals, and is odorless and non-foaming.

Resistor Coil Coating

The Pemco Corporation has announced production of a new type low-loss resistor coating that will be marketed under the trade name of "Lectraseel."

The new product is a vitreous coating that has been undergoing field and laboratory tests for the past five years but it is only recently that the company felt it was sufficiently efficient to stand up under war time operations and requirements.

This new coating is highly resistant to thermal shock and in the opinion of Pemco engineers its co-efficient of expansion and contraction, will, in nearly all cases parallel that of ceramic cores now in use and meeting government requirements. Accelerated weathering tests indicate that a coil coated with Lectraseel is immune to corrosion and should give satisfactory low loss service over a long period even under the most adverse conditions.

Mold Preventive

According to recent Canadian experiments sodium proprionate retards mold in wartime bread made from a flour containing larger amounts of wheat germ than the white flour normally used. The chemical does not alter the flavor, quality or the appearance of the bread. Tests are said to have shown that mold in butter and cheese is retarded when wrappers are impregnated with sodium proprionate.

New Capsule-Tablet

Lederle Laboratories is now using a new capsule-tablet for greater ease and efficiency in administering vitamin preparations and concentrates.

The new dosage unit originally developed by Atlantic Coast Fisheries, Inc., consists of an emulsion of the vitamins in gelatin, each unit being subsequently coated with a seamless, leakproof outer layer of plain gelatin. Important advantages lie in the fact that the oily vitamin mixture exists in tiny droplets firmly embedded in the gelatin mass and hence cannot escape through any flaw in the gelatin coating of the usual capsule. Furthermore, the dose is released gradually as the gelatin dissolves and in infinitesimal droplets, the preferred form for assimilation. No large drop of oil is suddenly released to cause eructation and unpleasant aftertaste. The final protective coating of gelatin surrounding the particle of emulsion—thinner than that required to hold oil—is extremely slippery when moist and slides easily down the throat. The tablets can be colored to designate different contents and doses.

Lederle products available in the new, convenient form are Vi-Magna, a multi vitamin tablet of high potency; Vi-Delta, containing vitamins A and D; Vi-Alpha, a high potency tablet of vitamins A and E; and Tocopherols, a source of vitamin E.

Post-War Koroseal

A statement of the post-war plans for koroseal, one of the familiar synthetic rubber-like materials was made recently to a group of department store and retail trade executives by L. H. Chenoweth of the B. F. Goodrich Company.

Chenoweth told the group that post-war expansion of the material's uses and the methods of its distribution were being geared to keep pace with the war-time six-fold increase in production facilities, plus the broadened knowledge of its processing possibilities gained through meeting the needs of the armed forces for a wide variety of products.

Among the post-war koroseal developments he predicts were insect screens which can be left in place throughout the year and may be rolled up like a window shade; bendable and "expandable" water pipes for permanent home installation; coated wall paper from which finger prints and grease marks can be removed with a damp cloth; garden hose which will be one-third lighter than top grade rubber hose yet will last as long or longer in service; and outdoor furniture seats and backs of woven koroseal strands which will be impervious to sun and weather.

A "right-now" field in which koroseal is helping meet a wartime civilian crisis, Chenoweth said, is in soling for shoes, an emergency application in which it has shown to such unusual advantage that it has already gone far beyond the role of substitute.

The market for koroseal-coated fabrics will be larger in volume and will include a wider range of materials, it was stated. He forecast the increased use of koroseal-coated draperies and upholstery fabrics which though delicately colored can be washed with a hose.

Stronger Tin Alloys

A further contribution to the development of stronger tin base alloys suitable for use as bearing metals is reported in a paper by Dr. W. T. Pell-Walpole, in the *Journal of the Institute of Metals* (England) for June 1943.

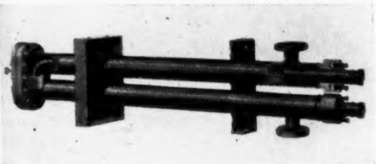
The tensile properties of a series of tin-antimony-cadmium alloys were examined after quenching and prolonged tempering treatments. It has already been shown (*Journal of the Institute of Metals*, Oct. 1942) that the hardness of tin-base alloys in the range antimony 9 to 10 per cent, cadmium 1 to 1½ per cent, balance tin, can be appreciably improved by heat treatment. It is now shown that the same range of alloys has improved tensile strength after quenching from the highest practicable annealing temperature followed by prolonged tempering at 140° C. The best alloy from this point of view contains 9 per cent antimony, 1½ per cent cadmium, balance tin. The tensile strength of the alloy reaches 6 tons per square inch as quenched and tempered, and this strength is retained at 140° C. This temperature was chosen as being near the maximum at which tin-base bearings may have to operate continuously.

NEW EQUIPMENT

Heat Exchanger QC306

The Brown Fintube Company has introduced a new and improved construction of the "Sectional Hairpin" heat exchanger, which is said to offer many advantages not available before in these exchangers.

Featured in these new exchangers is a non-removable rear end assembly. The operator is required only to remove the bolts—back the cover plate off far enough to clear the plates of the adjacent "section"—then swing the plate through a 180° arc, and rebolt it in this position, to gain clear, unobstructed entrance into the exchanger. According to a company spokesman, this greatly simplifies installation and maintenance, since it avoids the use of any heavy cumbersome members, to take off, lower to the ground, and then raise back and put on again, and makes inspection and cleaning quick and easy, and therefore not so likely to be "overlooked." Also, this easy accessibility to the interior of the unit permits hairpins employing "plain longtitudinal" or "cut and twisted" Fintubes having different ratios of "secondary to primary" surfaces and different heat transferring capacities to be interchanged one for another as desired, so that a single "stand" of these improved "sections" can be used for a variety of different duties.



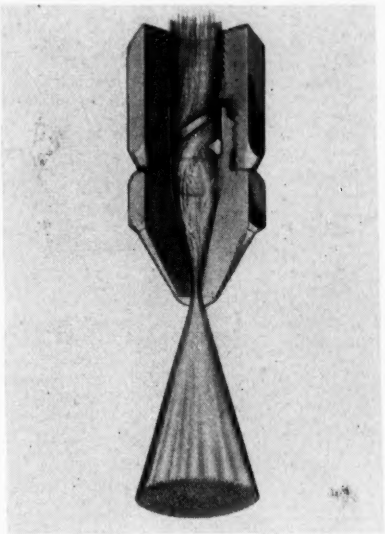
The new "head" seal introduced in these new exchangers, consisting of a solid ring and 2 split collars tightened with cap screws is said to avoid any outboard stress on the split ring lock. Tests using a solid copper gasket are said to have shown this construction capable of holding in excess of 2000 pounds pressure for days without trace of any "weeping."

Spray Nozzles QC307

Spraying Systems Company is offering the process industry a new injector type spray nozzle under the name "Fulljet."

This nozzle is claimed to produce a full cone spray pattern at a highly uniform degree of atomization. It is designed for use in gas washers and related process applications. The concentrated narrow-cone provides a high degree of impact for any given pressure. Where required an efficient syphoning action may be readily obtained. Water and other liquids of similar viscosity may be handled.

The "Fulljet" is made in brass, steel, Monel Metal and stainless steel. Removable internal vanes are a construction feature permitting quick, easy replacement.



This nozzle is stocked in a wide range of sizes each having definite performance characteristics. For example, if a process requires delivery of a liquid under 40 lbs. pressure at a rate of 3 GHM and a spray angle of 30°, a stock size injector type nozzle may be had to fulfill these requirements.

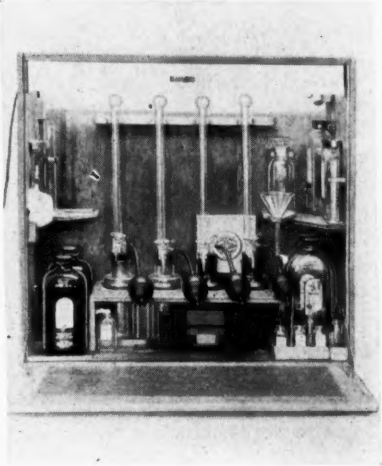
Fork Lift Truck QC308

To provide a fork lift truck with a wider range of capacities for lifting, moving and stacking materials, and at the same time to make production adjustments in line with wartime standardization programs authorized by WPB, Towmotor Corporation has developed a new model, designated LT-50.

Available in a 5000 pound capacity with either 104" or 144" lift, or in a 4000 pound capacity with 144" lift, Model LT-50 replaces Models LT-46 and LT-53 and rounds out the line of "one man gangs" offered in wheelbases of 40, 44, 50, 56, 62 and 72 inches and having corresponding ranges in speed, load and lift capacities. Maximum travel speed of Model LT-50 is eight miles an hour; loaded lift speed is 40' per minute. A 50" wheelbase, outside turning radius of 92, overall width of 42", overall length (less forks) of 88" and center underclearance of 6" permit maneuverability in close quarters, along narrow aisles and over steeply angled ramps. Standard fork equipment is of 36" length.

Water Testing Equipment QC309

A new test set for boiler water control analyses has been announced by W. H. and L. D. Betz. The test set includes all the necessary apparatus and chemicals for the determination of hardness, alkalinity, chloride, sulfite, and phosphate. A special cabinet designed for use on table or wall is provided. All apparatus and chemicals are contained in the cabinet, held in a secure position and ready for instant use. A portion of the opened cabinet door forms a convenient acid-resistant laboratory work table and a fluorescent light provides correct illumination for the tests.



The protection afforded by the cabinet minimizes breakage and eliminates errors caused by dust and dirt. A complete instruction book is included informing the operator how to perform the simple rapid tests and what the results mean in terms of plant control.

Rotary Hand Pump QC310

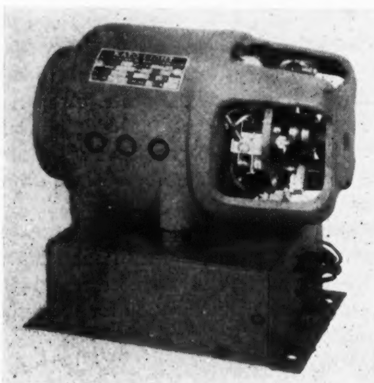
An all-bronze rotary hand pump, that develops a pressure of 125 pounds per square inch and has a capacity of 1.5 GPM, has been designed by the Blackmer Pump Company. The new unit, known as a "Dead Ship Starting Pump," is now in production and is being furnished to the U. S. Maritime Commission. It is also used for other high-pressure hand pump applications aboard ship, such as handling certain types of lube oils and fuels.

According to J. B. Trotman, General

Sales Manager of the Blackmer Pump Company, this new high pressure hand pump has, in addition to its marine uses, a number of industrial and commercial applications, chiefly in connection with hydraulic control devices and other equipment where high pressure, hand-operated pumping units are required. The new pump will therefore become a standard unit in the Blackmer line of rotary hand pumps, according to a company announcement.

New Current Converters QC311

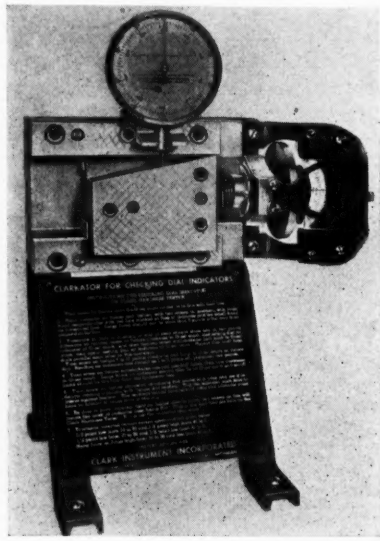
The addition of a complete line of newly designed, two pole, "Kato Rotary Konverters" has been announced by the Kato Engineering Co.



These new improved designs are available in 225 and 350 volt-amperes continuous load capacities at 3600 r.p.m. with 40°C temperature rise. Available for changing 32, 110 or 220-volts direct current to standard 110-volts, 60-cycle, A. C. ideal for operating standard A. C. appliances, radio and electronic equipment, electric signs, coin-operated machines, etc., in location where direct current only is available.

Dial Checking Instrument QC312

A new device for checking the accuracy of dial indicators has been announced by Clark Instrument, Inc. Called the "Clarkator," it employs the sine bar principle, checking against the tangent of the angle. The indicator to be tested is mounted on the top of the Clarkator with its spindle resting on a lapped angle block, which is advanced or retracted by a screw. After clamping the indicator in position so that its zero reading coincides with the dial face on the Clarkator, the screw is revolved in either direction to check other indicator readings. Reading of the Clarkator dial is by means of a mirror, enabling it to be seen together with the indicator.

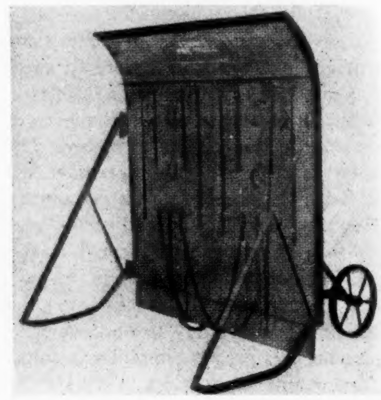


The Clarkator is said to be suitable for receiving and periodic inspection both of the standard direct reading indicator and the reversed reading indicator used on Rockwell hardness testers. The front angle is used when checking standard indicators, each revolution of the screw equalling .020", and each point on the dial .0002". The back angle provides a direct method of checking hardness tester indicators, each revolution of the screw equalling .01962". Complete directions are included with the instrument.

Fire Shield QC313

For fighting fires out in the open, in tank farm, refinery, and particularly for use on airplane landing fields, the new Foamite fire shield fills a long-felt want. It is built of sheet steel, reinforced with strong angle irons. Between the front and back plates is an insulating mineral wool blanket, one inch thick, capable of withstanding a temperature of 1200° Fahr.

The three observation ports and the four nozzle ports are each equipped with pivoted cover doors controlled from the rear of the shield. Anchoring chains are provided for securing playpipes in place.



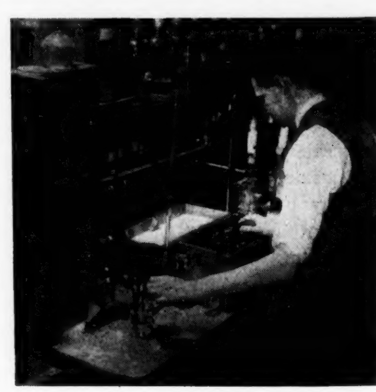
At the base of the shield are three hinged skirts, which give way readily upon meeting any ground unevenness.

The wheel carriage is bolted to the shield body, so that the parts may be packed knocked-down, to permit of a minimum transportation space. The rear supports of the fire shield give great stability. They are hinged to fold against the shield body for shipment, and when being wheeled into action. A full length handle bar extends the full width of the shield at the top. Two short handles, normally hanging down, may be used to maneuver the fire-shield at the scene of the fire.

The Foamite fire shield is said to be of particular value in the close-up fire fighting required when carbon-dioxide gas is used.

PH Indicator QC314

The Leeds & Northrup Company has announced an improved portable universal pH indicator which, according to the company, is fast, simple and easy to manipulate, and is said to be accurate and direct-reading not only with its own self-contained glass electrode but also with the quinhydrone, hydrogen or any other electrode following the Nernst equation.



CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York, N. Y. (10-3)
Please send me more detailed information on the following new equipment.

QC306	QC309	QC312	QC315
QC307	QC310	QC313	QC316
QC308	QC311	QC314	QC317

Name .... **(Position)** ....

Company ....

Street ....

City & State ....

Thiokol-Lined Underground Tanks QC315

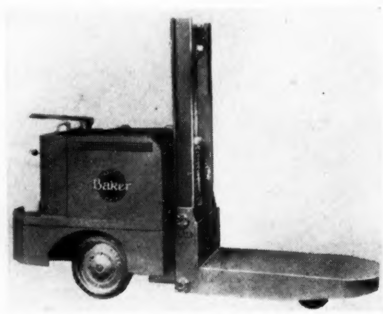
Designed to help offset a shortage of steel plate for purposes where no substitute is available, mammoth underground concrete fuel storage tanks, similar to that shown below, have recently been installed by the United States Navy in continental U. S. and strategic overseas bases. Placed underground to afford adequate protection against bombing attacks, construction of such tanks was expedited through the use of synthetic coating materials.

Early in 1940, the Navy's Bureau of Yards and Docks, foreseeing a shortage of steel plate, began to investigate the practicality of using concrete storage tanks to meet the increased demand for fuel storage facilities. While the heavy fuels presented no problem, light fuels such as diesel oil and aviation gasoline tended to seep through the pores of the concrete. High octane gasoline, moreover, suffered a serious drop in octane rating and formed a sticky gum when exposed to the alkaline present in the concrete. Intensive research on the part of the Thiokol Corporation, Trenton, N. J., resulted in a lining which, when applied to the concrete sidewalls, floors and columns of the tank not only protected the octane rating of the gasoline but formed a container which remained leakproof even when the concrete wall cracked due to stresses, ground shifts or temperature changes.

Applying the Thiokol lining resembles the hanging of wallpaper. After all surface irregularities have been removed, the tank walls are coated with a special synthetic rubber cement, developed by the Boston Woven Hose Company. When this has thoroughly dried and a second coat of the adhesive has reached the right stage of tackiness, strips of Thiokol are hung on the walls, columns, and floors so that every square inch of bare concrete is covered. In addition to being completely indistinguishable from the air, these concrete tanks are practically invulnerable to fire from normal operational hazards.

Lift Truck QC316

A new 6000 lb. capacity Hy-Lift truck, known as the Type H-3, has been announced by the Baker Industrial Truck Division of The Baker-Raulang Company. This new Hy-Lift truck combines the "self-loading" feature with tiering and is useful for both transporting and tiering skidded material.



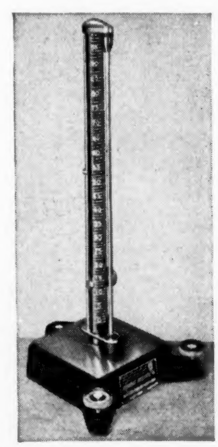
The truck is built on a 66" wheelbase; the overall length, including the operator's guard, is 123¾" and the truck is designed for operation in intersecting aisles 67" wide. Its overall height of 83" permits ready entrance into box cars for loading and provides a maximum lift of 67". The platform is 26½" wide x 54" long x 11" high in the low position.

The battery box has been increased in size from 27" x 38⅝" to 32" x 39½", providing space for enough additional battery capacity so that the truck may be operated continuously on longer shifts. Thus, under most conditions, there is no need to stop during a working shift to change batteries.

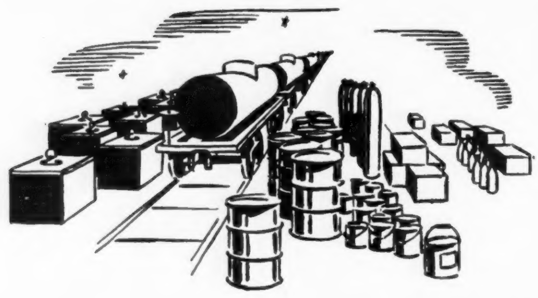
An improved and efficient hydraulic lift system is said to provide positive control of hoisting and lowering. The control lever, convenient to the operator's right hand, starts the pump motor and closes the valve forcing oil into the jack cylinder. Lowering is by gravity controlled by the same lever. A limit switch shuts off the pump motor at the upper limit of platform travel with auxiliary safety through a relief valve. The platform travels vertically on ball bearing rollers running in upright channel guides. The power is supplied by a single hydraulic jack and travel is compounded by sprockets and roller chains.

Resiliency Meter QC317

Not only rubber technologists and research scientists but manufacturers and consumers of rubber products or other extensible materials often want to know just how much resiliency or "springiness" is possessed by the material in question. Resiliency may be roughly defined as the property which accounts for the "bounce" or rebound of a rubber ball, for instance. It is of more than passing interest because it may be an index to other important properties. To measure resiliency is the function of an instrument known as the "Resiliometer," now manufactured by the Precision Scientific Company.



Resiliency of rubber and extensible plastic compounds is indicated by the rebound or a weighted plunger dropped on the test specimen from a predetermined height. Resiliency tests are conducted in the development of rubber and extensible plastic compounds, for measuring rate and state of cure; matching competitive compounds; factory control tests on cured samples of mixed batches; and on uncured samples of mater-batches; quality tests of the finished product without destroying the product; comparing heat build-up of various compounds; measuring plasticity of uncured compounds and masticated rubber.



PACKAGING & CONTAINER FORUM

Packaging and Shipping Situation Still Serious

THE packaging situation as it affects chemicals is in a state of uncertainty and many substitutions are being made. The use of less critical material is being stressed by the Container Division of the War Production Board. Conservation of steel by the continued reuse of metal drums, formerly referred to as single trippers, has been a major contribution of the chemical companies. However, the life of these drums is now nearing its end, many leakers being found in recent months due to their being in service for periods of from a year to two years. The Containers Branch of the War Production Board realizes this and upon proper application is giving consideration to supplying users with replacement drums. The usual priority ratings and clearance under order M-255, which must be procured before any drum can be purchased is necessary. The steel situation so far as steel for fabrication of drums is concerned is still critical and obviously the War Production Board will not give permission to replenish defective drums unless their use is essential.

The fibre drum situation has eased to some extent and permission is being given for the use of fibre drums in cases where it was difficult to procure this form of container a few months ago.

However there is still definite shortage of fibre shipping cases. With the single exception of 1941, demands upon fibre container production are the greatest in history, but this year's manpower shortage was not a factor in 1941.

According to Fibre Section of the Container Division, War Production Board, which deals with the problems of fibre shipping cases for all types of products, the present shortage is due to many contributing factors. The most common complaints are manpower and the production of wood pulp.

In addition to the heavy legitimate needs, a considerable extra burden has been placed on the pulp industry due to the effort of many buyers to protect themselves for the future even though their inventories now are reasonably adequate. This practice simply aggravates the situation.

Of necessity, many people have had to convert from the use of such materials as steel, tin, wood, metal and glass which has created an unprecedented demand for fibre. Paper was at the bottom of the list of materials that could be used, and when the supply became critical there was no substitute to fall back on.

When a steel container is replaced by a wooden container it may not seem to involve paper, but it does. The same facilities required to produce wood for wooden boxes are also required to produce pulpwood for the manufacture of paper. The labor and the transportation facilities required to produce lumber compete with the same facilities required for the production of pulpwood. When the wooden container demands exceed the supply the most logical substitute becomes a fibre container. It is, therefore, obvious that the conversion from containers of critical materials, both directly and indirectly, increases the drain on paper containers, paper, and paperboard production. Today thousands of tons of paper are being used as a direct substitute for steel.

Another important element in the consumption of paper is the amount needed for the Military overseas operations. The fibre containers have to withstand heavy punishment and abuse. That means from two to four times as much paper has to go into each overseas container.

WPB is making a strenuous effort to increase the production of pulp and container board. The leading manufacturers are also working on the problem. However, such a program requires time. For the remainder of this year, at least, it appears that the demands for the fibre shipping container will continue to exceed the productive capacity of the industry.

In the interest of the overall war program consumers are being asked to refrain from placing any order beyond actual minimum needs. Shippers, too, are being asked to re-use containers to the greatest possible extent.

Manufacturers with supplies of discontinued styles of containers in warehouses can help by offering these containers for sale. Firms lacking containers should seek out and buy such obsolete container stocks in their vicinity as can be used for shipping their products.

I.C.C. Regulations Amended

In order to ease existing regulations for the transportation of Dangerous Articles the Interstate Commerce Commission has from time to time since U. S. participation in the war, approved amendments which make it possible for the chemical industry to ship products under these amendments which have been incorporated for the duration. These amendments have been brought about by the inability of shippers to move their products when a specified container was not available or conditions were such that it was impossible to make shipment.

In this connection the Container Committees of the Manufacturing Chemists' Association are actively engaged in the promotion and development of containers for the chemical industry, both from the standpoint of safety and the standpoint of economics. These Committees, which are made up of men who handle packaging for various companies in the chemical industry, hold periodic meetings at which all forms of packaging are discussed. From these discussions come improvements and suggestions which are submitted to the Bureau of Explosives for their consideration and if approved are then submitted to the Interstate Commerce Commission. It is and has been the policy of the Bureau of Explosives to consult with the various committees of the Manufacturing Chemists' Association when requests are made of them for assistance in the packaging and shipping of chemicals. This close cooperation between the various agencies has been most effective in the development of containers for the chemical industry.

On August 31, as a result of a number of applications for amendment, the Interstate Commerce Commission published a list of proposed amendments to the regulations for transportation of explosives and other dangerous articles. These were subject to discussion for twenty days from that date, after which they were to become effective by an order to be issued by the Commission. Among the subjects involved were:

Reused containers; cars loaded by shippers; repairs to tank cars; explosives' samples; smokeless powder for small arms; spirits of nitroglycerin; paper waste, wet; corrosive liquid in tank trucks, outage; thionyl chloride; acetyl chloride, etc.; anhydrous hydrofluoric acid


T.P. CO.
HYPOID 90
46 LBS. N.W

samples; fluorine; liquefied petroleum gas and butadiene, loading; explosives, loading; matches, damaged, repacking; explosives placard; rule 4 of placard; explosives, sale by carrier; switching and placing cars in trains; leading or insecure packages, marking motor vehicles other than tankers; blasting caps in vehicle with explosives.

Good Job in Tank Car Handling

Efficient and economical use of tank car shipping facilities by the chemical industry has reduced the burden placed on tank car shipping, thus easing the transportation problem for petroleum transport, the War Production Board has announced.

When the war started, the chemical and allied industries were using about 14,000 tank cars. Today, despite the ever-increasing demand for chemicals in war production, the industry still uses the same number of tank cars.

A survey of chemical requirements at the outset of the war clearly indicated that several thousand more tank cars would be needed to transport the vast quantities of liquid chemicals essential to war production.

At the same time, petroleum had to be moved from the western oil fields to the industrial East, where every motorist, every oil-heated home and a great many war plants were in urgent need of petroleum. This tremendous movement of petroleum required literally thousands of tank cars—sometimes as many as 75,000—and the chemical shippers, to facilitate the transportation of petroleum to the Atlantic seaboard, exerted cooperative effort to keep their use of tank cars down to a minimum.

Many of the movements of chemicals in tank cars are in such unprecedented quantities that they are tank car transportation feats on a par with the million-barrel-a week movement of petroleum by tank cars. The shippers of chemicals, in accomplishing these feats, have done the equivalent of adding several thousand tank cars to the petroleum service.

Hundreds of carloads of alcohol are moving from plants which formerly made whiskey to the new synthetic rubber plants; other tank cars are carrying methanol to producers of explosives and essential plastics; several hundred more are carrying benzol for aviation gasoline; sulfuric acid for steel and other war materials requires some three to four thousand tank cars; molasses for alcohols and glycerine moves by tank car when water transportation is not available. Not only war materials but the nation's food production requires thousands of tank carloads of chemical solutions for fertilizers and soil enrichment materials.

Complete satisfaction with the industry's handling of the tank-car transportation problem was expressed by the Chemical Division of WPB.

Order L-197 Amended

In order to provide more positive control over the distribution and use of raw steel drums and to make certain that they are channeled into the most essential uses, the Containers Division of the War Production Board has amended Order L-197. Order M-255 which controlled the allocation of new steel drums has been revoked and its provisions incorporated in the new L-197 order.

These revisions make it possible for all applicants to use one official form, WPB 3233 instead of the two or three formerly required.

Reconditioned Drum Prices Set

Revised Price Schedule No. 43, reissued by the Office of Price Administration as Maximum Price Regulation No. 43 sets specific dollars and cents service charges and prices for reconditioned drums, effective October 12, 1943.

Ceiling prices for reconditioning services performed on 50 to 58-gallon used steel drums are established as $.90 per drum for "basic" reconditioning and $1.40 for "total" reconditioning. Both prices are based on delivery to the customer in accordance with the seller's past practice in handling transportation charges.

The above prices are applicable throughout the United States except on the Pacific Coast. Ceiling prices of $1.10 for "basic" and $1.65 for "total" reconditioning are provided for California, Oregon and Washington.

Ceiling prices for reconditioning of sizes, other than the 50 to 58-gallon capacity, continue to be provided for by Maximum Price Regulation No. 165.

The new regulation also sets specific prices for raw unreconditioned drums and requires that sellers of used drums, with certain exceptions, apply to the OPA for approval of a proposed selling price.

Tank Car Order Amended

On September 15 the Office of Defense Transportation in Amendment No. 1 to Special Direction ODT No. 7, extended the list of commodities which may be moved by tank car to points over 200 miles distant without a permit.

The amendment added about twenty commodities to the list of exemptions and removed four.

Drums for Oils

The War Food Administration has made arrangements with the WPB for shippers of edible and inedible oils to obtain new steel drums for essential replacements of worn-out stocks. Requests for replacements are to be filed every three months with the Containers Division of the WPB on form 1887.

Advisory Committee Members

Officers of the newly created Corrugated and Solid Fibre Container Industry Advisory Committee elected at the organizational meeting of the committee were announced recently by the Office of Price Administration.

E. R. Hankins, president of the Hankins Container Corporation, Cleveland, was elected chairman of the Committee, and P. A. Shilling, president of Waldorf Paper Products Company, St. Paul, Minn., was named vice-chairman.

This committee, which consists of twelve members, representing all sections of the country, will consult with and advise OPA on matters of price policy in connection with their industry, particularly with respect to Maximum Price Regulation No. 187 which establishes the ceilings of corrugated and solid fibre containers.

Paper Box Committee

The Office of Price Administration has named eleven officials of paper box manufacturing firms to serve on its set-up Paper Box Industry Advisory Committee. The purpose of the committee is to establish closer working relationships with OPA and the industry. Members of the new committee are as follows:—

Albert Bond, Consolidated Paper Box Company, Somerville, Mass.; Walter E. Trum, Gerbereux, Dufft & Kinder, Brooklyn, N Y.; Charles H. Sprowles, Sprowles & Allen, Philadelphia, Pa.; Laurence Pollock, Pollock Paper Box Company, Dallas, Tex.; Albert S. Daniel, W. C. Ritchie & Co., Chicago, Ill.; Fred Zur Schmiede, Kentucky Paper Box Company, Louisville, Ky.; R. J. Lowe, F. N. Burt Company, Inc., Buffalo, N. Y.; E. E. Fairchild, E. E. Fairchild Corporation, Rochester, N Y.; Paul A. Clement, Atlanta Box Factory, Atlanta, Ga.; Mark Nolan, Keystone Box Company, Pittsburgh, Pa.; Harold S. Fuller, Bicknoll & Fuller Paper Box Company, Boston, Mass.

Chemicals Added to Haulage Order

The Chemicals Division of the WPB has issued an amendment adding five additional chemical products to the list of commodities covered by the order to haulage request TR-2. The additional commodities are adhesives, butadiene, charcoal, phthalic anhydride, and styrene. The order TR-2 permits manufacturers and shippers to enter into reciprocal arrangements for the common use of transportation and storage of approximately sixty-one listed materials.

PLANT OPERATIONS NOTEBOOK

Maintenance of Battery-Powered Industrial Trucks

By *F. L. Sahlmann*, General Electric Company

THE battery-powered industrial truck, possibly because of its ability to operate longer without proper maintenance than most similar equipment, is often neglected to the point where its normal span of usefulness is seriously impaired, before it is finally inspected or overhauled.

Today, such negligence is inexcusable, since during no previous emergency in the country's history have conditions necessitated such rigid maintenance of industrial equipment as now.

Regular inspection and overhauling are the only positive guarantees of the continuous, efficient performance demanded by the 24-hour-a-day, 7-day-a-week production schedules now so common.

The following suggestions are designed to facilitate the care and maintenance of the electrical end of this important piece of equipment.

General Precautions

The batteries, sole source of propulsive energy, should be inspected and serviced at regular intervals, according to the recommendations of the battery manufacturers, and replacements made without delay.

Both the traction motor, which propels the truck, and the hoist motor, which drives the pump on trucks equipped with hydraulically operated hoist and tilt mechanisms, or the gear box on gear or chain drive hoist and tilt mechanisms, should be inspected monthly and overhauled approximately once a year.

The controller, the commutator, the contactor, the accelerating resistor and all allied parts should also be inspected and overhauled at like intervals.

Naturally, local conditions and the skill of the operator will dictate the frequency of inspection and overhauling, however suggested procedures are given below as a guide to efficient maintenance.

Traction Motor—Monthly Inspection

1. Remove dirt from commutator cover and surrounding parts to prevent it from falling into the motor.
2. Remove commutator cover and examine mechanism, noting that copper surface has a smooth polished appearance and is free of copper beads and grease.
3. See that the brush-holder mechanisms seat on brushes and that shunts and terminals are tight.
4. Wipe carbon dust from cables and brush holders.
5. Remove dirt from brushes by lifting springs and raising and lowering brushes in the carbon ways. Do not snap the springs, as this may chip the brushes.
6. Replace short or broken brushes with new ones of the proper grade. If only partial replacement is made, grind new brushes to same length as the other brushes in the motor.
7. Inspect connections for tightness.
8. Examine the interior of motor for charred or broken insulation or other injuries and replace damaged parts.
9. Replace commutator cover.

Traction Motor—Annual Overhauling

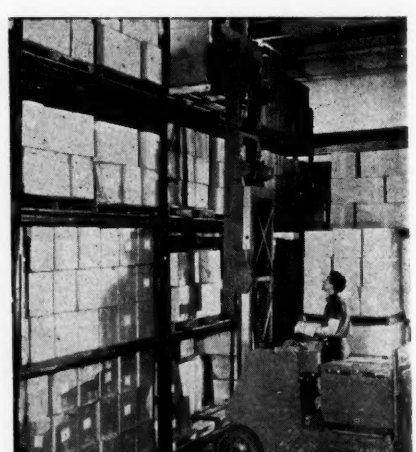
1. Remove motor from truck and clean outside of it.
2. Remove commutator cover and raise the brushes from the commutator to avoid damaging them.
3. Remove the nuts from the studs at the pinion end of motor and withdraw the armature complete with commutator-end bearing assembly and pinion end framehead assembly through pinion end. To obtain maximum life from bearings, they must be kept free of dirt. Therefore, when bearing assemblies are removed from motor, keep them clean.
4. Remove the pinion end framehead assembly and commutator-end bearing assembly from armature, employing suitable puller.
5. Blow out dust and dirt from armature, using clean DRY compressed air and wipe clean of oil and grease with a cloth saturated with carbon tetrachloride.
6. If armature is found in good condition, proceed as follows:
7. Bake at least 12 hours at 120 C (250 F).
8. While hot, paint with a varnish such as Glyptal No. 1201. Paint the string beads but take care to keep the commutator clean.
9. Bake for twelve hours at 120 C (250 F).

(NOTE: If it is found necessary to remove armature coils due to grounds, short circuits, or other damage, it is recommended that the complete armature be sent to the nearest service shop for repairs and rewinding.)

10. Take out the cap screws at the commutator end and remove the framehead.
11. Blow out the interior of motor with clean DRY compressed air and wipe clean of any oil and grease with carbon tetrachloride.
12. If field coils are tight and in good condition, paint them with varnish such as Glyptal No. 1201. Also, paint the interior of the motor with varnish, using care not to get any varnish on the polepiece faces. Otherwise, remove field coil as follows: Disconnect the cables and remove the cap screws holding field piece to frame. Then slide out the pole and coil

Handling loads in plant yard with pallets on trailers pulled by battery driven truck.

3,000 lb. fork truck with 15-ft. lift.



through end of frame and slip coil off pole. Keep each pole, coil and any accompanying shims together. Upon reassembly, parts should be returned to their original position, use new lock washers with pole-piece cap screws, make sure that contact surfaces are clean, cables are properly reconnected and cap screws drawn up tightly. Check the coil polarity. Guard against loose connections at all times.

13. Remove dust and dirt from brush holders and cables with carbon tetrachloride.

14. Note that brush-holder mechanisms operate properly; that brushes are free in carbon ways. that shunts and terminals are tight and that carbon ways are not rough or worn. Brushes should never be allowed to wear so short that the pressure arm of the lever rests on the top of the brush-holder carbon way instead of on top of the brush. All brushes must have the same length to obtain an even distribution of current. (NOTE: New brushes may be fitted to the commutator brush holder by placing a strip of fine sandpaper between the end of the brush and the commutator with the rough side of the sandpaper against the brush.)

15. Pole-piece cap screws must be tight and locked with lock washers.

16. Reassemble parts on armature. When replacing bearings, use a suitable brass sleeve so that the pressure will be on the inner race of the bearings.

17. Reassemble armature in frame, putting in new brushes if necessary.

The Commutator

The commutator should never be lubricated since the brushes contain sufficient lubrication. A dirty and greasy commutator will collect carbon dust in the grooves between the segments. This condition will cause a short circuit. The commutator should be kept smooth and concentric with the armature bearings. If the commutator brush surface should become rough, burned, pitted or excessively worn, the armature should be placed in a lathe and the copper turned down just enough to give a true surface. The mica between the copper commutator segments is undercut to 3/64 in. below the copper brush surface on new commutators and should be undercut as often as necessary to prevent the mica from becoming flush with the copper brush surface. Slightly round all sharp edges on the copper segments after turning or undercutting and remove all chips, sharp edges and copper dust from the grooves between the segments. Care must be taken to prevent the copper chips and dust from lodging in the armature winding while reconditioning the commutator, by using a suitable head covering over the end windings.

Pump Motor

The same procedure suggested for the inspection and overhauling of the traction motor should be followed in the case of those industrial trucks equipped with a motor-driven gear-and-chain or hydraulically operated hoist and tilt mechanism, except for the differences in the method by which the motor is removed or opened.

Details vary according to the particular type of truck involved, but in general it is necessary to first disconnect the coupling between the motor and the pump. The mounting screws may be differently located, but an inspection will make it readily apparent what changes need to be made in the routine as already mentioned in connection with the traction motor.

The Controller

1. Blow out all dust and grit with clean DRY compressed air.

2. If required, oil contact cam rollers through holes provided insulating support and oil-reverser-shaft bearing. Use an accepted lubricant in a long snout oil can.

3. Replace any broken springs or shunts and check all connections for cleanliness. Tighten if loose.

4. Inspect contact tips for cleanliness and wear and carefully remove any roughness on contact surfaces with a clean fine file. Contact tips worn halfway through should be replaced.

5. At yearly overhaul period, remove, clean and repack main shaft bearings with an accepted ball-bearing grease.

6. Both the contact tip pressure and the tip gap (distance between the tips when the contactor is open) should be checked periodically.

Contactor

The contactor should be inspected at the same time the controller is inspected, as follows:

1. Use clean DRY compressed air to blow out all dust and grit, being sure to blow out all metallic dust from contact points.

2. Replace any worn or broken points.

3. If the contact tips are badly burned, dress down with a fine file. (Do not waste contact metal.) Replace tips when worn halfway through.

4. Inspect cable and shunt connections for loose or faulty electrical contact.

5. Periodically check contact tip pressure and tip gap.

NOTE: Specific information relative to coil operation and contactor adjustment should be obtained from the manufacturer.

Accelerating Resistor

1. Blow out all dust and dirt with clean DRY compressed air and check all connections for tightness.

2. Check both resistor ribbon and porcelain insulator for damage or breakage.

From the foregoing, then, it is obvious that proper maintenance of this important piece of industrial equipment, maintenance that will largely eliminate expensive breakdowns and replacements, is based solely on the common-sense, but often disregarded, theory of preventing trouble before it starts.

Practical Plant Helps

By *W. F. Schaphorst*

Hot Water in Meters

Here is an occurrence that may interest readers who wonder what happens when one tries to run hot water through a water meter that was built for cold water metering.

We learned our lesson "accidentally." A water heater that was gas heated was not being properly watched and it caused hot water to back up toward the meter when hot water was not being used by the consumer. The water temperature was not automatically regulated. When the hot water finally reached the water meter itself things began to happen. Two unions started to leak and steam blew out of them. The water, you see, was truly "hot."

The leaking and blowing steam finally attracted a caretaker who decided that something was wrong and he shut off the gas, not knowing what else to do. After that it was found that the meter wouldn't "work" any more. The disc was sprung.

A new disc plus re-gasketing of the unions took care of the situation, but, as already stated, we learned what will "happen" to a cold water meter when it gets hot.

Static in Belts

The writer has before him a publication pertaining to power transmission in which the following dangerous statement is made regarding static electricity in belts: "The most common cause of static electricity in belts is slippage. Internal friction also causes static. Proper lubrication of the internal fibres reduces friction and at the same time stops slippage. Both causes of static are therefore removed."

The dangerous part of the statement is that nothing is said about belt creep. Creep, which is a form of slip, and is unpreventable, also causes static.

The best static remedy is to make belts conductors of electricity. As long as a belt conducts electricity there will be no static. Thus belts made of steel never give any static trouble. Belts that are treated with glycerine or other fluid that causes them to conduct the current will not give any static trouble even though they slip or creep.

MARBLEHEAD CHEMICAL LIME

HIGH CALCIUM

LOW IMPURITIES

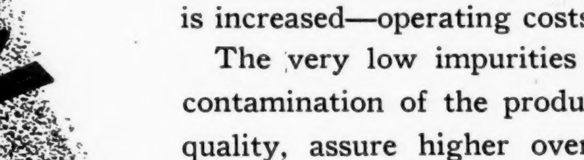
"ONLY high calcium lime can be safely used"—"must be low in impurities"—"low in iron and silica"—"preferably low in magnesium, alumina and inert matter"—"must be completely calcined—and core, over-burned or air-slaked material eliminated"—

These specifications are typical of those written every day, to cover chemical lime requirements for chemical processes and water softening. Marblehead lime fully meets these specifications—and more. Its unusually high calcium content provides vast chemical energy for fast, thorough reaction. Production is increased—operating costs reduced.

The very low impurities in Marblehead prevent contamination of the product, help to maintain its quality, assure higher overall chemical efficiency. It is this combination of consistently *high calcium content and low impurities* that has built up Marblehead leadership in the industry, over the past seventy years. Booklet "Modern Chemical Lime" on request.

★ FOUR FORMS ★

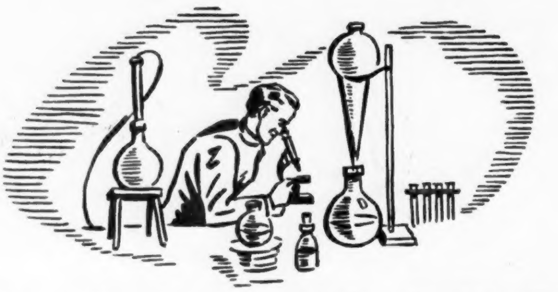
TRY A CAR NOW IN YOUR OWN PLANT



POWDERED QUICK LIME | PEBBLE LIME | HYDRATED LIME | LUMP LIME

MARBLEHEAD LIME CO.

160 N. LaSalle St. Chicago, Ill.



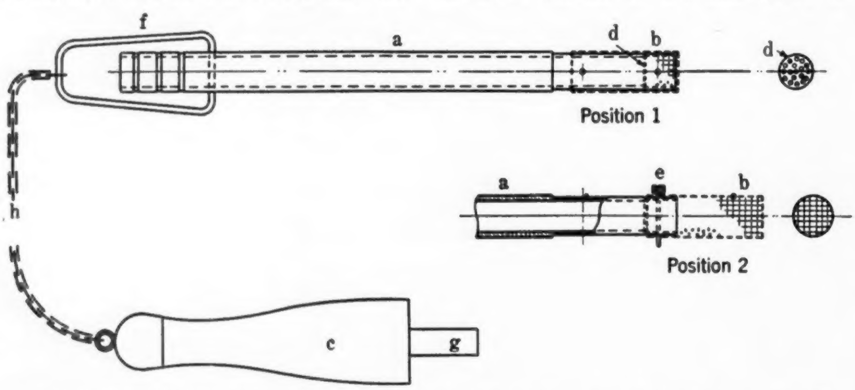
THE LABORATORY NOTEBOOK

Detecting Halide Gases

A simple, quick, and relatively accurate device for determining the presence of very small concentrations of organic halide gases in various atmospheres was reported by G. W. Jones and R. E. Kennedy in Bureau of Mines R. I. 3697. This device will enable safety engineers and others to discover quickly the presence of these gases and thus enable them to apply protective measures promptly. It can be used to detect leakage of halide gases from refrigerating and air-conditioning systems, in determining the presence of halide solvents in atmosphere of dry-cleaning and degreasing establishments, and in civilian defense for virtually all poison gases are halide compounds.

The halide tester described in the report utilizes the general principles of the halide lamp with the added feature of adsorbent charcoal to adsorb and concentrate the organic halides in the atmosphere tested, thereby increasing its sensitivity. The intensity of the green color produced when the exposed charcoal is heated in a flame in contact with a copper screen is roughly proportional to the concentration of the halide gases in the atmosphere, the time of exposure to the atmosphere, and the rate at which the atmosphere moves past the charcoal granules. If these factors are known, the approximate concentration of halide gases present in an atmosphere can be estimated.

The halide tester consists of a hollow metal tube, *a*, 6 inches in length, to which a cylindrical copper screen assembly, *b*, is attached. A handle, *c*, and a chain, *h*, are provided, by which the tester can be suspended or swung in the atmosphere to be tested. A small, circular screen, *d*, in tube *a* is required to support the charcoal when tests are made by aspirating the suspected atmosphere through the tube. Screen assembly *b* is placed in position 1 or 2, as shown in the figure below, depending on the manner in which the test is made.



Procedures

Aspiration Method—Enough charcoal to fill the opening between retaining screen *d* and the end of the tube is added, and screen assembly *b* is placed in position 1 to hold the charcoal in place. An aspirator bulb or other suction device is connected to the opposite end of *a*, and a measured volume of the atmosphere is drawn through the charcoal granules, thus adsorbing the halide gases. The screen assembly is then changed to position 2, and the charcoal is dropped out of the tube into the copper screen. The screen and charcoal are then heated in an alcohol or other suitable flame, and the presence or absence of a green flame is noted. If the green flame is not present, the sensitivity can be increased by aspirating larger volumes of the atmosphere through the charcoal and again testing in a flame for the green color.

Diffusion Method—The screen assembly is removed by withdrawing pin *a*, and 0.5 cc. of charcoal is added. The assembly is then replaced on tube *a* in position 2 and again fastened with pin *e*. The tester is suspended in the suspected atmosphere long enough for the charcoal to adsorb the halide gases by atmospheric diffusion. It requires about 20 times as long to adsorb the halide gases by this method as by the agitation method. The diffusion method is recommended for areas in which the halide gases may be present in such concentrations that it would be inadvisable for persons to stay in atmosphere while making the tests.

Agitation Method—The rate of adsorption of the gases by the charcoal may be increased by swinging the tester in the suspected atmosphere. This procedure has been found to give a rate of adsorption of the gases by the charcoal much greater than any of the previous methods, and a definite color indication can be obtained in a minimum time.

Sensitivity

The range of detection extends from 1 part in 5 million (requiring a swinging time of 5 minutes) to 10 parts or more per million (requiring a swinging time of 15 seconds or less). Results show that any of the organic halides examined, whether chloride, bromide, iodide, or fluoride, can be detected when the concentration is 1 or more parts per million.

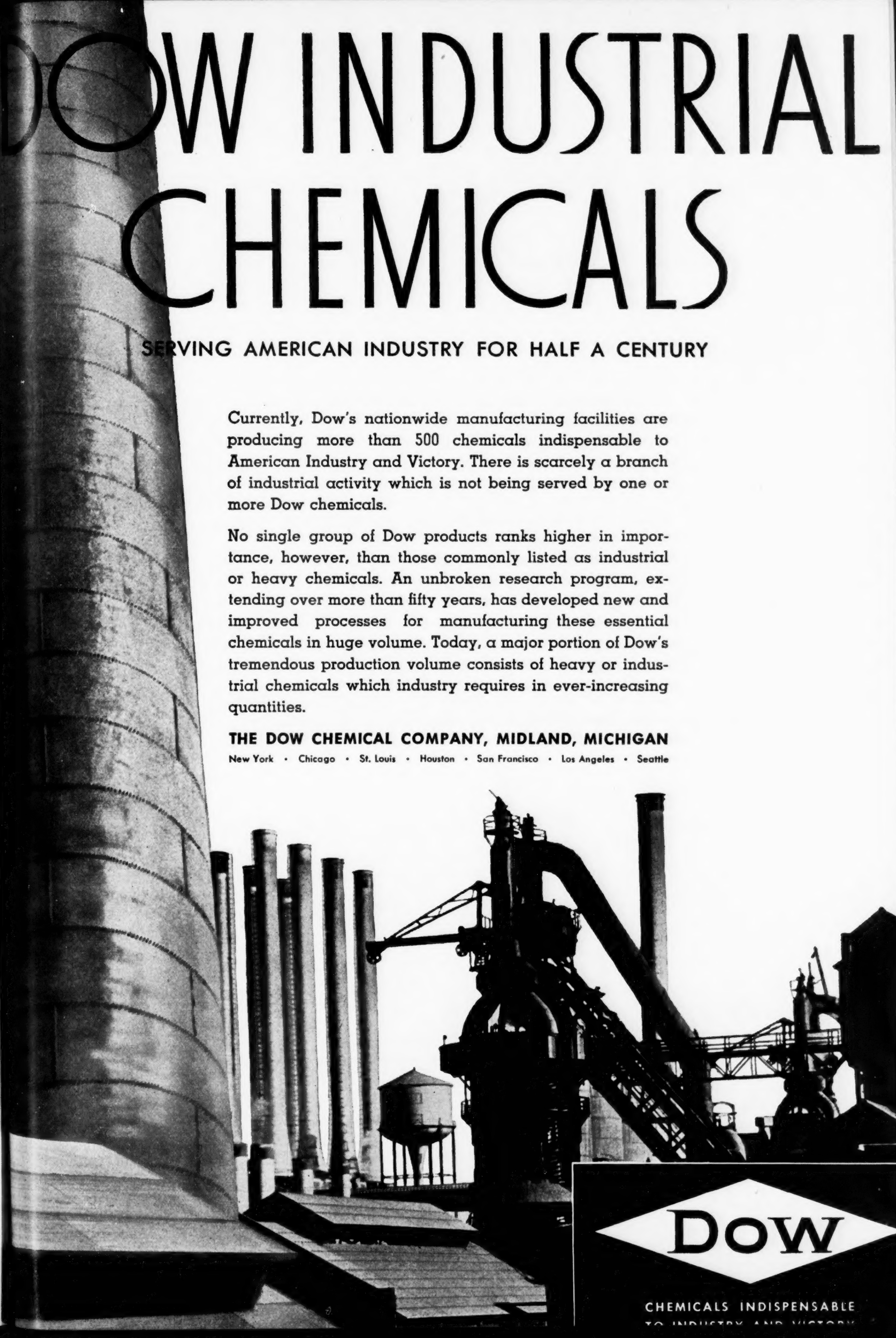
On the basis of tests there appears to be no direct relation between the degree of sensitivity and the number of halide atoms in the gases. Chloroform, having 3 chlorine atoms in the molecule as does chloropicrin, shows a higher degree of sensitivity for a given swinging time than chloropicrin and, on the other hand, than most gases containing only 1 or 2 halide atoms.

Uniting Mercury Columns

To rapidly reunite a broken column of mercury or other liquid in a thermometer, Michael Cibener in *The Chemist Analyst* suggests the use of a centrifuge. Wrap a wad of cotton around the bulb, and place the thermometer bulb down in a centrifuge tube. Place a counterweight in the opposite tube. Gradually raise the speed of rotation to about 1000 r.p.m., and in about 2 or 3 minutes the column will again be continuous. According to Mr. Cibener this method has been used many times with no resultant breakage.

Suggestions Wanted

Do you know any new short cuts or time savers that might be useful in other laboratories? Send them to Chemical Industries, *522 Fifth Avenue, New York, N. Y. We will pay $2 for each contribution published.*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INDUSTRY'S BOOKSHELF

Frontiers in Chemistry. R. E. Burk and Oliver Grummitt, editors. Volume 1—Large Molecules. Collaborators: H. Mark, Polytechnic Institute of Brooklyn; E. O. Kraemer, Biochemical Research Foundation of Franklin Institute; A. Tobolsky, R. E. Powell and H. Eyring, Princeton University; R. M. Fuoss, General Electric Co.; C. S. Marvel, University of Illinois; Emil Ott, Hercules Powder Co., 313 pp., tables.
Volume II—Chemical Background for Engine Research. Collaborators: E. F. Fiock and F. D. Rossini, National Bureau of Standards; F. C. Whitmore, Pennsylvania State College; G. von Elbe, Carnegie Institute of Technology; Bernard Lewis, U. S. Mines Bureau; O. Beeck, Shell Development Co. Interscience Publishers, Inc., N. Y., 1943; 297 pp., tables, $3.50/vol.

NEW SERIES entitled "Frontiers in Chemistry," two volumes of which will be published each year, was recently begun under the auspices of Western Reserve University. Each is a collection of lectures on related subjects given at the university by well known scientists. Thus "Volume I, Large Molecules," has chapters on the mechanism of polyreactions, the investigation of high polymers with X-rays, the colloidal behavior of organic macromolecular materials, the ultracentrifuge and its application to the study of organic macromolecules, the elastic-viscous properties of matter, the electrical properties of high polymers, the organic chemistry of vinyl polymers and the chemistry of cellulose and cellulose derivatives.

"Volume II, Chemical Background for Engine Research" has chapters on combustion research, chemical thermodynamics of hydrocarbons, synthetic methods for hydrocarbons, kinetics of flame and combustion, the experimental side of combustion research in engines and the physicochemical aspects of lubrication.

In general, the lectures are reviews of known methods, by experts on these specialized subjects, and short bibliographies are included at the end of each chapter. The indexes are rather briefer than might be desirable.

Glue and Gelatine, by Paul I. Smith. Chemical Publishing Co., N. Y., 1943; 145 pp., $3.75. Reviewed by *M. L. Sheely*, technical director, Armour and Co.

BASED LARGELY ON ENGLISH PRACTICE although a few American references appear, the manufacturing methods and equipment described in this book correspond only very generally with American practice. The author makes no claim that the volume, consisting as it does of 142 pages, represents a comprehensive treatise, in fact he expressly states that "the book is planned and written more as a primer for the practical man than an enlightened and original book for the research chemist . . . "

The chapters on historical aspects, skin and fibre structure, and the chemistry of proteins (20 pp.) are exceedingly brief but interesting. The technical production chapters (65 pp.), including raw material, preliminary processing, extraction, clarification of liquors, evaporation, and grease recovery all appear to follow English practice, and many of the indicated practices are quite obsolete in present American industry. Obviously in such a short space it is only possible to touch on the individual subjects, and it is unfortunate that the author did not make comparisons with American methods.

The chapters on properties and applications of glue and gelatine comprise the remainder of the volume (57 pages) and include one chapter of 3 pages on modern plastic materials for gelatine plant construction, notably "Haveg" for lining tanks and "Saran" tubing, purpose of which is not indicated. It is of interest to note that the author completely omits any reference to a major use of glue, namely, sandpaper and other glue-bond abrasive products including grinding wheels.

The volume is replete with typographical and technical errors. Although the title page does not so indicate, the author refers (p. 108) to the present volume as the second edition and it would seem that most of such errors should have been removed at this stage. To the scientific reader the presence of definite misinformation greatly detracts from the authenticity of the balance of the work. In any event, the volume contains little of interest to the scientific worker and barely more than a brief outline for the practical man.

American Women of Science, by Edna Yost. Frederick A. Stokes Co., N. Y., 1943, 232 pp., $2.00.

ONE OF THE FEW WORKS about American women of science, this book holds a surprise for those in the field as not many people realize the extent to which women have already achieved distinction in important departments of science. The present critical manpower shortage has removed the "Keep Out" sign from the doors of many chemical companies, the once cloistered domains of men only. As more and more women enter alien fields to replace men, the general consensus acknowledges that sex seldom determines intelligence and ability.

One of America's foremost experts in the prevention of diseases resulting from industrial poisons, Alice Hamilton pioneered in uncovering and publicizing knowledge of these diseases. When Harvard University finally established a department of industrial medicine—largely as the result of her work—it broke its long established precedent of having no women on its faculty and invited Dr. Hamilton to head the department. Back of all the laws which attempt to deal with the health of workers in the poison trades, the forces which she helped set into action still effectively wage new battles.

Since 1890 chemists have been trying to purify tuberculin, the substance Koch had found would indicate the presence of tuberculosis. It took a woman, Florence K. Seibert, weighing scarcely a hundred pounds and severely lame, to isolate pure tuberculin. For her many outstanding achievements she has been honored with the Ricketts Prize, the Trudeau Medal of the National Tuberculosis Association, the Garvan Medal of the American Chemical Society, the Achievement Award of the American Association of University Women, and several honorary degrees, including one of two honorary doctorates in science bestowed upon women at the fiftieth anniversary of the University of Chicago.

Just about the time the first World War had decreased the number of well-trained young men, Katharine B. Blodgett entered General Electric's Schenectady laboratory as one of Dr. Langmuir's assistants. Her researches in physics led her to the discovery of how to make non-reflecting glass. Out of it grew a "color gauge," used today as a simple method for measuring the thickness of any transparent or semi-transparent substance within the range one- to twenty-millionths of an inch.

Ellen H. Richards, Annie J. Cannon, Florence R. Sabin, Mary E. Pennington, Lillian M. Gilbreth, Libbie H. Hyman, Wanda K. Farr, Hazel K. Stiebeling, and Margaret Mead, the nine other women Miss Yost describes, had neither the educational nor the occupational opportunities offered to the B.S. of 1930 and 1940. An indication of what the latter may be expected to accomplish in the near future may be gained by glancing through "The Official Gazette of the U. S. Patent Office."

BOOKLETS & CATALOGS

Chemicals

A574. Adhesives. 3-page file-size technical service bulletin describes Paisley grip-tight label paste, an adhesive designed for permanently adhering paper labels to all surfaces and materials. Gives properties, applications, methods of use and prices. Paisley Products, Inc.

A575. Carburization. The simple sodium cyanide-sodium chloride bath and the so called "activated cyanide" bath for liquid carburizing of steels are described in this 24-page, file-size booklet entitled "Now—Uniform Case Hardening up to 0.150 Inches with Cyanamid's Controlled Carburizing Baths." Gives data on the use, characteristics and results of the manufacturer's several brands of case hardening and carburizing compounds. American Cyanamid and Chemical Corporation.

A576. Cellulose Acetate. A new handbook on Plastacele, cellulose acetate sheets, describes in detail procedures and operations involved in the production of finished articles from this material. File-size and containing 34 pages, the booklet is divided into two sections: fabricating, and physical properties. Headings under fabricating include care and handling, general fabricating information, sawing, shearing and breaking, blanking and punching, drilling, tapping and threading, routing and shaping, sanding, finishing, cleaning, cementing, forming, and mounting and installation. Physical properties and their modifying factors are described in detail. E. I. du Pont de Nemours & Co., Plastics Department.

A577. Chemicals. October 1943 price list and catalog of M. M. & R. essential oils, balsams, aromatic chemicals, oleo resins, certified colors, flavoring materials and basic perfume products. 48 pages, pocket size. Magnus, Mabee and Reynard, Inc.

A578. Chemicals. October 1943 price list of Merck medicinal, analytic, technical and photographic chemicals. Merck & Company, Inc.

A579. Chemicals. A new price list covering fine chemicals for use in pharmaceutical, drug, food and cosmetic manufacture has been issued by the Chemo Puro Manufacturing Corporation. The list includes merbromin, ichthammol, lithium salts, benzoates, preservatives and similar products.

A580. Chemicals. Price List X, 8 pages, pocket size, covering essential oils, aromatic chemicals, oleo resins and concentrates, and resinoids and extrols has been issued by Schimmel and Company, Inc.

Colors. A new shade card entitled "Bernazine Colors For Printing on Acetate Rayon" shows samples of 15 basic coloring materials especially prepared and selected for their suitability for printing acetate rayon. Offered to printers upon request on firm letterhead. Bernard Color and Chemical Corporation, 333 Hudson St., New York, N. Y.

A581. Engineering Reports. "How To Prepare An Engineering Report" is the title of a helpful 72-page guide, which has been especially prepared by Alexander Hamilton Institute for its technically trained subscribers.

A582. Water Treatment. This 4-page, file-size pamphlet discusses and presents data on characteristics of the newly developed acid-regenerated zeolites generally known as the carbonaceous zeolites. The Cochrane Corporation.

A583. Waxes. Eight-page, pocket-size list of natural and synthetic waxes made by National Wax Refining Company. Also gives uses.

Equipment — Containers

E980. Colorimeter. This 14-page bulletin describes the operation and features of the Lumetron photoelectric colorimeter, model 402-E. Special sample holders, a test tube adapter and a light pickup unit for fluorescence and turbidity are also described. Photovolt Corporation.

E981. Containers. "How To Specify Corrugated Boxes" is a very helpful little booklet that does just what the title indicates. Tells what should be included in paper box specifications and what terms to use. 24 pages, pocket size. Hinde and Dauche Paper Company.

E982. Dust Collection. The van Tongen system of industrial dust recovery is described in a 28-page, file-size booklet produced by the Buell Engineering Company, Inc. Attractively illustrated with photographs, drawings and graphs, the booklet covers the whole broad subject of dust control starting with a definition of dust and working through detailed descriptions of the company's line of dust collection equipment.

E983. Glossmeter. A 9-page, file-size pamphlet describes in detail the use and operation of the Photovolt photoelectric glossmeter, a device for measuring the gloss of paints and varnishes, ceramics, plastics, paper and machined or polished metallic or non-metallic surfaces. Photovolt Corporation.

E984. Magnetic Pulleys. "Operation and Maintenance of Magnetic Pulleys" is a new 40-page handbook which features information on trouble shooting, trouble prevention, repairs, recommended operating practices, and general maintenance. A discussion of magnetic theory is included as a background for the practical suggestions offered. The booklet is liberally illustrated with drawings and diagrams, and includes a number of simple formulas, a pulley selection table, and other data. Dings Magnetic Separator Company.

E985. Materials Handling. New 64-page catalog No. 435 presents latest information on the complete line of Syntron vibratory materials handling equipment. This line includes electric vibrators for bins, hoppers, chutes, vibra-flow vibrating feeders, dry chemical feeder machines, weigh-flow gravimetric feeder machines, vibratory paper joggers, hydraulic vibrator, feeders and feeder machines, replacement shaft seals, concrete vibrators, electric hammers and self-contained portable gasoline hammer concrete breakers and rock drills. Shows installations and applications. Syntron Company.

E986. Materials Handling. Six-page leaflet describes and illustrates various applications of Robins materials handling machinery. Robins Conveyors, Inc.

E987. Motors. A new 88-page handbook entitled "Ideal Maintenance Handbook" tells how to keep motors and generators operating continuously at peak efficiency without dismantling and describes and illustrates the Ideal line of equipment, which includes variable speed transmissions, machine tool accessories, wiring devices and tools, industrial electric equipment, and a rechargeable battery for flash lights. Ideal Commutator Dresser Company.

E988. "Insulating Materials" is the name of this 62-page spiral-bound, tab-indexed book which gives properties and descriptions of the following materials as they are used for electrical insulation: varnished cloth, varnishes and compounds, glyptals, paper and fibre, tapes, cords and sleevings, varnished tubings, mica, wedges and soldering material, cement and hand cream. A number of illustrations, diagrams and tables of physical properties are included. General Electric Appliance and Merchandise Dept.

E989. Insulating Materials. The "Industrial Heat and Power Conservation Manual," a 20-page file-size booklet, offers suggestions for calculating and reducing preventable heat and fuel losses through insulation with mineral wool. Heat loss is discussed for such types of equipment as boiler drum

heads, hot storage tanks, ducts and breachings, pipe and fittings, feedwater heaters, dryers and ovens, flanges, boiler shelves, and boiler settings. Included is a sample heat loss estimate sheet with instructions for use. Industrial Mineral Wool Institute.

E990. Laboratory Apparatus. Entitled "Laboratory Utilities," this 112-page file-size catalog contains detailed information on a variety of laboratory apparatus and equipment along with suggestions for stepping up laboratory efficiency. Subjects include autoclaves, burners, centrifuges, digestion and extraction apparatus, distillation apparatus, heaters, hot plates, sieves, stirrers, shakers, titration illuminators, water stills. Precision Scientific Co.

E991. Laboratory Press. Bulletin 350A issued by the Watson-Stillman Company gives a complete picture of the company's line of hydraulic laboratory presses and equipment. The presses described are adaptable for die sinking or hobbing, extraction of liquids from vegetable seeds, chemical cakes, fats, briquetting, hot molding, testing concrete, and compression and bending tests on various materials.

E992. Paint. "Architectural Paint Products" is the title of this 12-page, file-size leaflet, describing manufacturer's paints for various architectural uses. A feature of the leaflet is a codified list of 279 ready-made clauses for use in writing paint specifications. By writing down a short series of code numbers, painting specifications can be given clearly and precisely at a great saving of time. U. S. Gutta Percha Paint Company.

E993. Personnel. Reflecting the increased public interest in plans providing retirement benefits for employees, the Pension Trust Division of the Chase National Bank has published a 92-page book entitled "Pension, Bonus and Profit-Sharing Plans." The book tells how a pension plan may be financed by investment in annuity contracts or in securities, and the differences between these methods. It summarizes possible provisions covering employee membership in pension plans, benefits accruing from such plans, and methods of administration. It discusses actuarial factors, operating costs and investment considerations. Deferred compensation plans of the bonus or profit-sharing type are also reviewed. The Chase National Bank.

Personnel. The "Deduct-O-Graph" is a rotary pasteboard device which automatically shows the proper payroll deduction for any employee when proper settings are made for marital status, wage range and pay period. It is reported that the device has been tested by factory payroll officials in comparison with the set of tables ordinarily furnished for figuring payroll deductions, and that the "Deduct-O-Graph" resulted in not only much greater speed but greater accuracy as against slow, laborious figuring and a high percentage of errors for the tabular method. The "Deduct-O-Graph" is available only to firms requesting it on a business letterhead. George S. May Company, 2600 North Shore Ave., Chicago, Ill.

E994. Power Transmission. Proper selection and maintenance of pulleys, shafting and belting is the subject of this 32-page file-size booklet, "Is Industry's Power Transmission Program Geared to War Production Demands?" Gives practical suggestions for a planned program for maintenance, salvage and reuse of power transmission equipment. Attractively illustrated. Cling Surface Company.

E995. Pressure Maintenance. "Tepetate—Six Years Later" is the title of a 6-page reprint of an article describing a successful pressure maintenance project in the Tepetate oil field in Louisiana. Clark Bros., Inc.

E996. Proportioning Equipment. A new bulletin No. 1700 illustrates and describes the complete line of Proportioneer's constant-rate and flow-responsive proportioning equipment for the process industries. Among the operations described and diagrammed are: treating water, food products, oils and boiler water; blending ingredients in the production of plastics, synthetic rubber, lubricating oils, and aviation gasolines; diluting caustic or other concentrates for rubber reclaiming and rayon manufacture; and sampling of end products and bulk shipments for continuous check. Proportioneers, Inc.

E997. Pumps. This 60-page, file-size, beautifully illustrated catalog gives unusually complete information on the line of Westco and Pomona turbine-type pumps. Descriptions, photographs, sectional drawings, specifications, performance tables and operating characteristics are given for each of about 28 models. Several pages of useful engineering data on hydraulics is included in the back. Joshua Hendy Iron Works.

E998. Refractories. Six-page file-size folder describes H-W Magnamix, a Washington magnesite ramming mixture of special interest to operators of open-hearth and electric steel furnaces for new bottoms and for the maintenance of existing bottoms. It also serves as a monolithic inner lining in non-ferrous metallurgical furnaces where the requirements are for a highly basic refractory. Gives description, properties and installation information. Harbison-Walker Refractories Company.

E999. Safety. The Division of Labor Standards of the U. S. Department of Labor has reproduced two posters entitled "Learn to Lift Correctly" and "Right and Wrong Ways to Lift" as a part of its campaign to cut down job injuries. The posters are reproduced in color and are available in sizes 16 x 21½" and 10 x 30" respectively.

E1000. Safety. "How To Teach Fire Fighting" is the title of a 16-page educational leaflet describing a method of teaching industrial fire fighting by demonstration. The leaflet gives detailed instructions for demonstrating various types of extinguishers on three general classes of fires: fires in ordinary materials, fires in flammable liquids and fires in live electrical equipment. Walter Kidde and Company.

F1. Welding. "Welding Stainless Steels" is the name of a 64-page file-size booklet which covers its subject with unusual thoroughness. The book describes and interprets the techniques commercially employed, and the precautions to be observed, in the welding of stainless steel by the accepted processes. The material is arranged under the following headings: effects of heat on stainless steel; metallic arc welding; atomic hydrogen welding; oxygen-acetylene welding; electric resistance welding; and welding Pluramelt steel. The booklet is especially well gotten up and is replete with attractive and informative photographs, diagrams and charts. Allegheny Ludlum Steel Corp.

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 Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

October ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1943

Anhydrous Ethanol Finds New Uses in Vital War Jobs

Expanding Future Predicted for Product Pioneered by U.S.I.

For years, anhydrous ethanol has been used in the making of dyes, pharmaceuticals, antifreeze (Super Pyro) and as a solvent in resin and nitrocellulose compositions.

War in the tropics, and the urgent need for large quantities of anti-malarials, have changed this picture radically. For both quinacrine (atebrin) and plasmoquin, the now-famous substitutes for quinine, are dependent on anhydrous alcohol at certain stages in their production. To visualize the magnitude of this one use alone, it is necessary only to realize that this country today is producing quinacrine at the rate of 1,200,000,000 tablets per year — the equivalent of 50 per cent more than the world's total prewar supply of quinine.

Synthesis of Sulfa Drugs

Not only in the manufacture of anti-malarial drugs is anhydrous alcohol finding new uses. Many chemical reactions which cannot be carried out in 190 proof ethanol become practical in anhydrous. Such reactions, for example, are currently being used in the synthesis of the newer sulfa drugs, sulfadiazene, sulfamerizine, and sulfamethazine. They have served, too, in greatly simplifying the production of vitamins B_1 and B_6.

As a solvent, anhydrous ethanol is acquiring importance in still other fields. An interesting new process for soap manufacture, in which the recovery of glycerol is greatly simplified, uses anhydrous alcohol. This helps satisfy the huge demand for glycerol in munitions and protective-coatings manufacture. Anhydrous alcohol is essential as a solvent to compensate for the water content of the low-proof ethanol used in wetting down SS nitrocellulose.

Many, if not all, of these uses for anhydrous ethanol will continue to grow with the coming of peace. Others will undoubtedly appear. All will amply justify U.S.I.'s pioneering effort, back in 1922, in introducing commercial anhydrous alcohol to the American market at a price only slightly higher than that of regular 190 proof.

What's in a Name?

Four different spellings of "Atebrin" currently appear in the literature about this new anti-malarial. "Atebrin" say both the American and British *Chemical Abstracts.* "Atebrine" says *Thorpe's Dictionary of Applied Chemistry.* "Atabrin" says *The Merck Index.* "Atabrine" says the *United States Dispensary.* On top of this, chemists call it quinacrine hydrochloride — or 4 amino-1-diethyl amino pentane 3-chloro-7-methoxy-acridone, for short.

Resin-Improved Red Lead Primer Protects Billions in War Equipment

Paint for Ships and Military Equipment of "Compelling Importance" in War, Says Navy

An unseen protector for America's great Maritime fleet, as well as for other implements of war valued in billions, has gone on duty as a result of an important improvement in paint formulation using alkyd resins. Today's *red lead primer,* on an alkyd base, widely used as an under coat for ships and other metal surfaces exposed to corrosive conditions, is saving extra man-hours as well as "saving-the-surface."

From U.S.I.'s Stroock & Wittenberg Division has come much of the resin progress raising the protective qualities of red lead primer, as well as other naval and military paints. S&W "Aroplaz 1328,"* for example, is a widely used alkyd constituent of paints meeting Army, Navy and Maritime specifications. In the Maritime primer (Specification MC52A1), it provides durability, flexibility and dull sheen. Sudden temperature changes, salt water spray, and even deformation of the surface may be encountered without opening cracks in the coating. The bond to the base metal is unusually tenacious. At the same time, fast drying is not sacrificed . . . a vitally important factor in today's shipbuilding.

Finish Coat for Battleships

The widely-used Navy finish coat (Specification 52-R-13) is another important paint to which "Aroplaz" gives great durability. Used on both outside and inside surfaces, it has the good brushability and drying characteristics needed where time is at a premium. Retention of the exact shade of color selected for maximum safety of the ship and non-reactivity with the necessary pigments, is a further strong point for "Aroplaz" resins.

(Continued on next page)

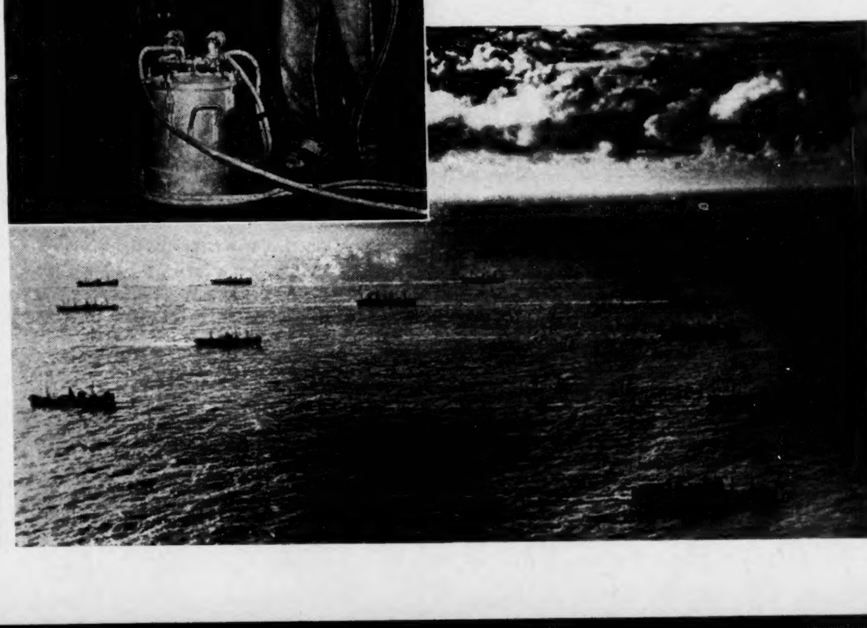
* Reg. U. S. Pat. Off.

New Equipment Design Speeds Vitamin Extraction

Fish oils are first saponified with aqueous ethanol-caustic soda. The vitamin-containing unsaponifiable fraction is then extracted countercurrent with an immiscible solvent $(CH_2Cl)_2$, in a specially-designed cylindrical vessel. The vessel, described in a British Patent is fitted with a revolving shaft carrying partly semicircular, partly semielliptical baffle discs. This affords small clearance with the vessel on one side, wider clearance on the other. The discs are staggered so that solvent entering at the bottom is forced to follow a tortuous path up through the soap solution.

New Mothproofing Agent

A patent has been granted for a mothproofing composition consisting of a solution of a guanidine salt, with *p*-tert-amylphenol or a fatty acid in an organic solvent. Solubility of the salt is enhanced by the use of a substance such as *n*-butyl alcohol.



To protect America's "bridge of ships" against the ravages of drenching rains, salt spray and scorching sun, shipyards are using thousands of gallons of tenacious new red lead primer formulated with S&W resins.

ADVERTISEMENT—*This entire page is a paid advertisement.*

Improved Red Lead Primer

(Continued from preceding page)

Resins Improve Duck Coating

In still another application, S&W resins find themselves close to the front lines as a constituent of a protective coating for cotton duck (meeting Jeffersonville Q.D. Specification 242). In the tropics, particularly, where rain, sun, humid heat and mold growth would mean quick decay for unprotected canvas, this coating with a combination alkyd-hard resin base has a vital job to do on tents, hospital sidewalls, and the like. An important characteristic of the resin combination (Aroplaz-Arochem) is its compatability with chlorinated paraffin, which is included in the formula to keep the coating non-flammable.

One measure of the importance of paints in the war — and of the production demands for resins being made on the Stroock & Wittenberg Division of U.S.I. — can be obtained from recent figures released by the U. S. Navy Department, which state that some 50,000 carloads of paint are used on American men-of-war alone! The paint for one battleship would cover a fence 5 feet high — 273 *miles* long!

Foresight in the expansion of facilities for resin manufacture by U.S.I. has been a highly important factor in increasing the volume as well as the protective quality of paints for war. The highly specialized job of producing alkyds by combining phthalic anhydride, a fatty acid or an oil and glycerine is being carried out continuously under complete automatic control at one modern plant. For the production of ester gums, maleics and other resins in which natural rosin is a raw material, another new U.S.I. plant operates day and night in the heart of the Southern Pine country, with the wood rosin itself piped in from an adjacent producer.

Military paints, ranging all the way from stencil paint to spar varnish — from airplane "dope" to the familiar lusterless olive drab which marks the "jeep" the world over — are being formulated with one or more of S&W's six types of resins. These are:

"S&W" ESTER GUM — all types.

CONGO GUM — raw, fused and esterified.

AROPLAZ — alkyds.

AROFENE — pure phenolics.

AROCHEM — modified types.

NATURAL RESINS — all standard grades.

Granulated Soaps Kept Dust-Free by Spray Treatment

As granulated soaps lose moisture, the individual granules tend to break down into a fine dust which is annoying to the user. This difficulty is overcome by spraying the granulated soap with small quantities of certain polyhydric alcohols or other materials which act as hygroscopic agents and binders, according to a British Patent recently issued to a prominent soap manufacturer.

The spray must be carefully applied so as to hold the individual granules together without causing lumping. A material which is non-soluble in the soaps is also of advantage, as it tends to coat the surface of each granule rather than being absorbed to a point where increased quantities are required.

Agents specifically mentioned are glycerol, ethylene glycol, diethylene glycol, sorbitol and mannitol. Also alkyl phosphates ($MRHPO_4$) in which M is an alkali metal and R an alkyl group.

A New Oxidant for Vat and Sulphur Dyes

Sodium chlorite, a new oxidizing agent used for bleaching cotton and other cellulose fibres, is reported to be valuable in developing vat and sulphur dyes.

Dyes are first reduced with sodium hydrosulfite to make them soluble. After absorption by the fabric, they must be oxidized to restore their original color. Chlorite is applied either in hot sodium bicarbonate or acetic acid solution. The chlorite is reduced to common salt which is easily removed.

The new process is said to speed up output of khaki, olive-drab and other cotton goods as much as 30 per cent, to simplify reproduction of colors, to produce more absorbent, softer, better-rinsing goods.

Non-Toxic Treatment For Insulin Hypoglycemia

Acetopyruvic acid, prepared from ethyl sodium acetone oxalate, is reported to provide protection against death by insulin hypoglycemia. Its action suggests a possible conversion to glucose during a critical demand on blood sugar. The drug is said to be non-toxic in moderate doses and easily absorbed from the alimentary canal.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Bonding of steel or light alloys, with a strength exceeding riveting, is said to be possible with a new synthetic resin adhesive. The process is also said to be effective in bonding metals to dissimilar products such as wood, plastics, and leather. **(No. 739)**

U S I

A mastic flooring material, especially suitable for areas where static electricity is a hazard, is announced. Easily applied over present floors, it is reported to provide an electrically-conductive surface which is easily cleaned, resistant to hard wear and heavy wheel loads. **(No. 740)**

U S I

A potash fish oil soap, available in limited quantities, is suggested as a carrier for insecticides or for use in commercial soap manufacture. **(No. 741)**

U S I

A new preservative for pharmaceutical and cosmetic products, reported to combine high efficiency in low concentration with extreme solubility in water, is announced. The preservative is said to be colorless and odorless. The manufacturer also announces another new preservative for products containing oils, fats, and alcohols. **(No. 742)**

U S I

A new paint spray gun, in which critical materials are limited to the air nozzle and needle valve, is announced. Nozzle design is said to prevent clogging, clean easily, and permit pattern adjustment from round to flat. **(No. 743)**

U S I

A new non-rubber sealing tape, stated to be both waterproof and non-toxic, is being recommended for sealing food, medicine and other consumer goods packages. **(No. 744)**

U S I

A new alcohol, (hydroabietyl) is now being offered as a paper coating, as a holding agent for china wood oil in varnish, and as a wetting agent for dispersing pigments in vehicles or during grinding. The new alcohol is valuable also as a plasticizer for protein film formers. **(No. 745)**

U S I

A luminous tape has been developed for indicating the location of aisles, machines and other important points during blackouts or power failures. The tape is reactivated, after service in the dark, by exposure to light from ordinary incandescent lamps. **(No. 746)**

U S I

Combustion tests, at temperatures up to 1000°F., are facilitated by a new electrically-heated, multiple-unit furnace. Originally designed for carbon determinations on gasoline cracking catalysts, the furnace is said to be adaptable for many other organic combustions. **(No. 747)**

U S I

A new boiler coating is offered to provide greater protection against both corrosion and fungus growth. The coating is said to retain its plasticity, and resistance to "craze," indefinitely. **(No. 748)**

U.S.I NDUSTRIAL CHEMICALS, INC.

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Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%, Absolute
*Super Pyro Anti-freeze
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Ansol M
Ansol PR

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Amyl Acetate
Butyl Acetate
Ethyl Acetate

OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS
*Diatol
Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Ethyl Acetoacetate
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ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

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CANADIAN REVIEW

By W. A. Jordan

Penicillin to be Produced

The Dominion Government is financing the construction of two plants, one in Montreal and the other in Toronto, for the production of penicillin. The original contract calls for the preparation of 26 billion units of penicillin, with initial production scheduled for February and capacity yield of 500 million units weekly anticipated by mid-April. Some 250 employees will be engaged in the penicillin enterprises and it is understood that the improved yield process, developed by the Banting Institute, will be utilized in these large scale operations.

W. A. Jordan

Although this will be the first commercial production of penicillin in the Dominion, investigational work was initiated by the Banting Institute several years ago. A thorough research program was conducted to study the effects of certain elements, such as copper, manganese, boron, zinc, etc.; of vitamins, yeast and soil extracts, and other supplements, on the rate of growth of the mold and the consequent penicillin yield. The effect of light, temperature, aeration, and other factors was also appraised.

The primary features of the process evolved from this research and recent pilot plant studies, are counter current extraction at low temperature, careful pH control, and utilization of a suitable buffer for re-extraction into water. An ingenious method of removing excess buffer is a definite contribution to the production of a sodium salt of penicillin with high activity per milligram.

The final concentrate is dispensed aseptically into ampoules, frozen solid and dried under high vacuum from the frozen state. The chemical as recovered is a yellow brown, fluffy powder which redissolves readily for injection.

Gluten and Starch from Wheat

The National Research Council is conducting investigations on processes for the separation of gluten and starch from wheat. Experiments to date have resulted in the production of a remarkably pure gluten by means of process modifications originated by the Council.

The starch project is of major significance at the present time in view of Canada's large wheat reserves, and relatively scant supply of corn. Particular attention is being given also to an investigation of the chemical and physical properties of this gluten, especially as to its possible use as a plastic material.

Potash Restricted

An order issued by the Fertilizer Administrator stipulates that no fertilizer containing more than 8 per cent potash, (K_2O), may be sold or used in Eastern Canada without permission of the Administrator.

Eastern Canada, which includes Ontario, Quebec, and the Maritimes, normally consumes 94 per cent of the fertilizer sold in Canada. In view of the 20 per cent shortage of potash anticipated, the order is designed to prevent the use of extra potash except where absolutely needed to prevent crop deterioration.

Chemical Plant Expansion

A statement issued recently by the Department of Munitions and Supply reveals that of the 800 million dollars invested by the Government in new plants and equipment, 18 per cent was developed to the chemicals and explosives industry. This investment, the largest allocation made to any single phase of Canadian industry, is now paying dividends in the form of 10,000 tons of wartime chemicals and explosives weekly, with more than 900,000 tons produced to date.

It is reported, officially, that ammonia and ammonium nitrate form a heavy proportion of chemical output, and other chemicals being produced by these Government financed, but privately operated, plants include: hexachlorethane, monoethylaniline, aniline oil, sulfuric acid, carbamite, phthalic anhydride, dibutylphthalate, diphenylamine, acetic anhydride, and synthetic butanol.

Chilean Nitrate Agreement

The Governments of Canada and Chile signed a trade agreement recently, ratifying an informal arrangement made in 1941, which facilitates importation of Chilean nitrate and iodine. It is established that these two items "shall not be subject on importation into Canada to any form of quantitative control of imports less favourable, nor to duties or charges higher than, like products, natural or synthetic, originating in any other foreign country."

Importation of nitrate is not as vital currently, of course, as during the days of limited domestic production of synthetic nitrate. The Dominion's imports prior to the War totalled about 40,000 tons annually, while Canadian consumption of iodine is of the order of 80,000 pounds a year.

Labor Priorities

Drastic new restrictions to minimize mass labor turnover and designed to enhance industrial efficiency in essential industries, have been drafted by the Canadian Government. Henceforth, in plants with "A" or "B" labor priority ratings, no employer may discharge any male employee, and no male worker may leave his job, without prior consent of the Government's National Selective Service Bureau.

Although labor priority ratings of individual industries are secret, it may be assumed with a high degree of certainty that the chemical producing industry, in particular, is in a high category. Official advice indicates that when the Industrial Classification system was drawn up, the chemical industry was divided into two main groups. That is, the section of the industry devoted to the production of industrial chemicals, and the Miscellaneous Chemical Products group, which classifies such activities as the production of inks, cleaning and polishing preparations, adhesives, gelatin, etc.

The activities of chemical departments of establishments in other industries, such as, dyeing of textiles, processing of rubber, refining of petroleum, etc., are grouped with the industry to which they are attached.

A careful study has been made of each industrial activity to determine its relative essentiality, and thereby, its labor priority rating.

Chemical Production

Latest reports available indicate that the production of chemicals, exclusive of Government plant output, was down two points in August from the July figure, although up 11 points over August 1942, to stand at 126. A marked change in the character of demand has been progressively evident during this year, with increased demand from war industry and curtailment in the requirements in many divisions or ordinary industry. The effects of priorities, labor shortages, and limited availability of other raw materials, have been logically reflected in the latter's chemical needs.

During the past month in particular, many consuming industries have experienced serious difficulties in obtaining corrugated shipping cartons and glass containers. Top priority on both these items has been allocated to food packers.

Extreme shortages exist in a number of imported chemicals, and in domestic phos-

(Turn to Page 562)

NEWS OF THE MONTH

Postwar Rubber Seen in Hands of Politicos

Synthetic rubber will be developed to the point where the restoration of natural rubber is a matter of indifference, says Dr. John T. Blake at A. C. S. rubber chemistry meeting.

NEITHER rubber technologists nor economists but "national and international politicians" are most likely to decide the postwar status of synthetic rubber, it was predicted this month at the fall meeting of the Rubber Division of the American Chemical Society by Dr. John T. Blake, chairman of the division and chief chemist of the Simplex Wire and Cable Co. The meeting was held at the Commodore Hotel in New York City October 5, 6 and 7.

The supply of natural rubber is not coming back quickly, if at all, in the opinion of Dr. Blake, and we must plan to be wholly dependent on our own resources. "Whether we ever revert to the natural product is a question that will probably be decided by the politicians," he said. "The decision will be based on factors that this group here might feel had little bearing on the matter. It probably will not be a decision of this group of technologists, and it may not even be the choice of the economists. We must be prepared for any eventuality.

"Synthetic rubber must be developed to the point where the restoration of natural rubber is a matter of indifference. I have confidence that this can and will be done."

Outlining progress since last year's meeting, during which the Baruch report on the rubber situation was issued, Dr. Blake stated that there is now a supply of synthetic rubber which is "increasing rapidly."

"Shortly we shall have available as much as is needed for war and essential civilian purposes," he said. "The rubber industry is now substantially converted to its use, although synthetic rubber is not all that we might wish it to be when we use it in the production of useful articles. However, we are manufacturing from it things that are serviceable."

Some natural rubber must be used in the manufacture of certain types of tires, Dr. Blake pointed out. To meet this need, about 10 per cent of our normal supply is now being imported from South America, Liberia, and Ceylon.

The rubber industry is benefiting from the war, Dr. Blake declared, explaining that the industy has accomplished in approximately two years with new substances what it required over a hundred years to do with natural rubber.

The problem of designing synthetic rubber compounds for sub-zero application was discussed in a paper by G. J. Wilson, R. G. Chollar, and B. K. Green, of the National Cash Register Co. Not only are low temperature requirements of aircraft manufacturers frequently revised downwards, but other complicating factors are being introduced in the form of new aviation fuels, they pointed out.

The authors demonstrated that all types of gasolines exert a profound influence on compounds made from the various synthetic rubbers. Severe service conditions of fuel immersion and low temperature render many compounds completely unsuited for aviation application. Gasoline immersion removes from all synthetic compounds vitally necessary plasticizers. Neoprenes, normally considered more freeze resistant than other synthetics, were found to be actually less resistant upon prolonged exposure to extreme cold.

The case for thorough application analysis where synthetic compounds must meet severe service conditions was strongly argued, since experimental results demonstrate the possibility of a critical synthetic rubber part failing completely after an hour's field service. The dyne tensiometer was reported to permit accurate evaluation of synthetic stocks under many simulated field service conditions.

The meeting attracted a good attendance. Thirty papers, dealing largely with the problems of synthetic rubber, were presented at the technical sessions.

German Chemical Trusts Engulf Companies in Occupied Europe

"Quisling" industrialists in the chemical industry field have shared most heavily in the spoils of Nazi conquest, according to an Office of War Information report surveying the vast expansion of German chemical interests in Europe. The report is one of an OWI series dealing with the techniques by which German big business, under protection of the Nazi terror, has wrested an economic empire embracing virtually the entire industry, trade and finance of Europe.

Richest booty in the chemical industry field was obtained in France, Belgium and the Netherlands. Three French companies joined I. G. Farbenindustrie, Germany's big dye trust and leader of the spoils-hunt in the chemical industry field, to form a combine which controls almost the entire French dyestuff industry. Major collaborationist in this deal is the Kuhlmann Corporation, largest chemical concern in France. The new company is S. A. de Matieres Colorantes et Produits Chimiques (S. A. Francolor). German interests hold 51 percent of its stock.

I. G. Farben has also concluded a profitable deal with the largest metallurgical company in Spain—Altes Hernon de Biskava—for the operation of a nitrogen plant, and has similar agreements with chemical companies in Denmark. The Nazi conquest of Czechoslovakia provided I. G. Farben with its largest single piece of loot—the Aussig and Falkenau plants of the Aussig Union for Chemical and Metallurgical Production, one of the largest chemical works in Europe. The Farben dye trust dominates the entire chemical trade of Slovakia through Dynamit Nobel A. G.

Second to I. G. Farbenindustrie in pharmaceuticals is Schering A. G., in Berlin, which is now proceeding with plans to take over the markets of south-eastern European countries. Schering has already established a plant in Budapest to produce pharmaceutical and galvanotechnical articles, cable silk, etc. The chemical field in Bulgaria has been invaded by one German company and one Italian company which have obtained concessions from the Bulgarian Industrial Council to erect two factories in Bulgaria for the manufacture of acids.

Heads ACS Rubber Division

Dr. Harold Gray, technical supervisor of Tire Division, B. F. Goodrich Co., has been elected chairman of the Rubber Division of American Chemical Society for 1943-44. He succeeds Dr. J. T. Blake of Simplex Wire & Cable Co.

SEC Shows Chemical Industry Profit Status

Survey to provide renegotiation yardstick shows that chemical industry is outranked by twenty other groups in net profit as percent of invested capital.

WHEN AGENTS OF the Securities and Exchange Commission went on a new kind of accounting prowl a few months ago to provide a unique yardstick for use in the renegotiation of war contracts, it was expected that the chemicals group, whipping boy of so many investigations following World War I, would show big war profits.

The idea was to take the 1941 figures of hundreds of corporations holding war contracts, since they were the latest available, and test profits against the amount of invested capital in each company. In all, 864 companies comprising 59 industrial groups were investigated, among them 38 companies in the chemicals group.

The cold figures showed that far from being the leader in profits as a per cent of invested capital, the chemicals group ranked behind twenty others and, by the same test, had made less in 1940 and 1941, years when war contracts made up a large share of their production, than in 1936 and 1937, when their output was almost wholly for civilian consumption (see CHEM. IND., Sept. '43, pp. 325-331).

The average for the 864 companies was 9.91 per cent in 1941. That is to say, the average company's net profit after all charges was 9.91 per cent of the amount of capital invested in that company. The average for the 38 companies in the chemical group that year was 12.33 per cent.

Looking at the matter another way, however, the figures, which were compiled also for the years 1936-40, showed that in 1936 the 36 companies then in the chemicals group had a net profit that was 13.45 per cent of the invested capital, while in 1937 it was 13.01 per cent.

The SEC now is engaged in a compilation of figures for 1942 in the same vein. It is expected that by the time they are published, the 1941 figures for most of the industry groups included in the survey will have been scaled downward somewhat through renegotiation of contracts, and in this the chemicals group probably will be no exception.

For the purposes of the survey, the Commission defined invested capital as comprising funded debt, non-current debt to affiliates, other long-term debt (including such classifications as serial notes, mortgages, notes with a maturity longer than one year, long-term purchase contract liabilities or purchases money obligations, etc.), minority interest, preferred stock, common stock and surplus.

The range among the chemicals manufacturers by this test was from the Parker Rust-Proof Company, the final net profit of which in 1941 was 37.11 per cent of invested capital, downward to Lac Chemicals, Inc., formerly Pacific Distillers, Inc., which had a deficit for the sixth straight year and wound up in the red to the extent of 7.69 per cent of its invested capital.

Among the group as a whole, the Commission computed invested capital in 1941 at $1,807,676,000. The net profit was figured, after all charges, as $222,580,000, or 12.33 per cent of invested capital. For the same number of companies, with invested capital of $1,729,839,000, the final net profit in 1940 of $209,519,000 figured out at 12.15 per cent.

In 1936, thirty-five companies in the group had invested capital of $1,498,343,000 and a final net profit of $201,549,000, or 13.45 per cent.

To what extent industry is being taxed to support the war effort also is illustrated by this group. Net profit in 1936 before income taxes as a per cent of capital was 15.63 per cent of invested capital. Taxes cut it down to 13.45 per cent. The comparable figures for 1941 were 25.64 per cent and 12.33 per cent. In other words, profits in 1941 were cut in half by taxes.

Profit Record of 37 Chemical Companies

(All dollar figures are in thousands. Parentheses denote net loss.)

	Invested Capital 1941	Net Profit 1941	Profit as % Invested Capital 1941	1939	1936
Air Reduction Co.	$ 41,398	$ 7,117	17.19	13.67	20.08
Allied Chemical & Dye Corp.	175,865	21,417	12.18	12.45	16.20
Atlas Powder Co.	23,110	1,905	8.24	6.34	7.18
California Ink Co, Inc.	2,233	444	19.88	11.56	18.36
Catalin Corp.	1,565	203	12.97	11.47	22.64
Clorox Chemical Co.	1,528	390	25.52	27.66	20.73
Columbian Cabon Co.	30,225	3,529	11.68	9.85	14.30
Commercial Solvents Corp.	20,477	2,615	12.77	9.19	12.28
Consolidated Chemical Industries, Inc.	8,378	1,015	12.12	7.40	8.48
Dow Chemical Co.	66,305	7,771	11.72	10.74	16.81
E. I. du Pont de Nemours & Co.	676,571	90,401	13.36	14.42	16.11
General Aniline & Film Corp.	53,048	4,116	7.76	10.50	5.08
General Printing Ink Corp.	6,465	943	14.59	14.46	20.29
Hercules Powder Co.	43,415	6,099	14.05	12.73	12.10
Hilton-Davis Chemical Co.	2,662	235	8.83	7.81	....
Interchemical Corp.	15,851	2,088	13.17	10.61	10.09
International Products Corp.	4,962	312	6.29	5.62	3.96
Koppers Co.	100,991	6,657	6.59	1.88	2.95
Lac Chemicals, Inc.	325	(25)	(7.69)	(12.90)	(4.58)
Lindsay Light & Chemical Co.	440	107	24.32	7.05	2.89
Liquid Carbonic Corp.	22,170	2,128	9.60	5.58	6.89
Mathieson Alkali Works, Inc.	23,431	1,744	7.44	4.67	6.63
Monroe Chemical Co.	1,360	104	7.65	7.26	13.74
Monsanto Chemical Co.	53,824	6,769	12.58	11.18	14.39
National Cylinder Gas Co.	11,669	1,878	16.09	15.49	....
National Oil Products Co.	5,678	869	15.30	18.10	26.19
Newport Industries, Inc.	5,869	708	12.06	7.93	14.26
Parker Rust-Proof Co.	2,692	749	37.11	40.85	56.16
Pennsylvania Salt Mfg. Co.	17,370	1,649	9.49	8.41	8.96
Union Carbide & Carbon Corp.	319,819	42,042	13.15	11.41	13.80
United Carbon Co., Inc.	15,538	1,712	11.02	9.92	14.77
United Chemical Co.	2,864	294	10.27	7.45	(.13)
United Dyewood Corp.	6,390	265	4.15	4.80	7.19
U. S. Industrial Chemicals, Inc.	18,077	836	4.62	.77	(.66)
Victor Chemical Co.	8,388	1,187	14.15	14.28	....
Warren Refining & Chemical Co.	188	22	11.70	(1.68)	15.56
Westvaco Chlorine Products Corp.	13,000	1,296	9.97	10.20	6.03

Stotesbury Mansion to Penn Salt for Lab

Pennsylvania Salt Manufacturing Co. has purchased Whitemarsh Hall, 147-room residence of the late Edward T. Stotesbury in the Chestnut Hill section of Philadelphia, for conversion into a research laboratory, according to Leonard T. Beale, president of the company.

Plans are to remodel the interior of the building to accommodate a staff of 75 research chemists and assistants. The exterior and grounds with their famous replica of the Gardens of Versailles will be maintained in their present state, Mr. Beale said. Stotesbury, who was president of Drexel & Co. in Philadelphia and a partner of the late J. P. Morgan, Jr., died in 1938.

The laboratory is expected to be ready for occupancy next spring, at which time the present research laboratory at Pennsylvania Salt's Philadelphia plant will be abandoned. The move is said to represent an expansion of the research activities of the company. Dr. S. C. Ogburn, manager of research and development, will be in charge of the new laboratory and will be assisted by R. L. Brown, director of research, Walter S. Riggs, director of development, and A. E. Gibbs, advisory technical director.

To Feature Testing Apparatus

Laboratory methods which are new, and testing equipment that will speed war production, will form an important contribution to the 19th Exposition of Chemical Industries, scheduled for the week beginning December 6th next, in Madison Square Garden, New York. Forecasting some of the highlights of the exposition Charles F. Roth, president of

International Exposition Co. and manager of the Chemical Industries Exposition predicted that exhibits in this field will form an important focus of attention for many visitors.

Concannon to Help Industrialize Chile

C. C. Concannon, chief of Chemical Unit of Bureau of Foreign and Domestic Commerce, Department of Commerce, will leave for Santiago early in November to act as consultant and advisor to the Chilean Government on matters related to the development of various branches of the chemical industry in that country.

On loan from the United States Government for one year, Mr. Concannon expects to spend about three months in Chile. Upon returning to the United States, he will be located at the Corporacion de Fomento de la Produccion of Chile, 120 Broadway, New York City.

In his absence, T. W. Delahanty will serve as acting chief of the Chemical Unit. Mr. Delahanty will also continue in his present capacity as chief of the Drugs and Pharmaceuticals Unit.

A part of Mr. Concannon's work will be to bring together American concerns interested in establishing operations in Chile and Chilean groups desiring to share in financial participation in mutual undertakings.

CALENDAR OF EVENTS

AMERICAN GEAR MANUFACTURERS ASSN., 26th semi-annual convention, Edgewater Beach Hotel, Chicago, Ill., Oct. 25-27.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Pittsburgh, Pa., Nov. 15-16.
AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS, INC., Iron & Steel Div. and Inst. of Metals Div., Annual Convention, Sherman Hotel, Chicago, Ill., Oct. 17-19.
AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS, INC., Petroleum Div., Annual Convention, Ambassador Hotel, Los Angeles, Calif., Oct. 21-22.
AMERICAN PETROLEUM INSTITUTE, 24th Annual Meeting, Palmer House, Chicago, Ill., Nov. 8-11.
AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, 39th Annual Meeting, Benjamin Franklin Hotel, Philadelphia, Pa., Dec. 7-9.
FEDERATION OF PAINT AND VARNISH PRODUCTION CLUBS, Fall technical symposium, Hotel Cleveland, Cleveland, O., Oct. 22-23.
INDUSTRIAL HYGIENE FOUNDATION, Eighth Annual Meeting, Mellon Institute, Pittsburgh, Pa., Nov. 10-11.
NATIONAL ELECTRICAL MANUFACTURERS ASSN., annual meeting, Waldorf-Astoria Hotel, New York, N. Y., Oct. 25-29.
NATIONAL FOREIGN TRADE COUNCIL, 30th National Foreign Trade Convention Hotel Pennsylvania, N. Y., Oct. 25-27.
NINETEENTH EXPOSITION OF CHEMICAL INDUSTRIES, Madison Square Garden, New York, N. Y., Dec. 6-11.
PACKAGING INSTITUTE, INC., Annual Conference, Hotel New Yorker, New York, N. Y., Nov. 4-5.

Du Pont Research Director

Dr. Fenton H. Swezey, above, was named director of acetate research in the Du Pont Co. upon the retirement of Dr. Van L. Bohnson. Dr. G. S. Hooper steps up to Dr. Swezey's former position as assistant director.

Increase Powers of WPB Field Offices

Thousands of application forms formerly routed to the War Production Board in Washington will now be processed in the field as a result of specific measures recently announced by operations vice chairman H. G. Batcheller to implement the decentralization policy. Co-incidentally, Mr. Batcheller revealed a reduction in CMP paper work which will have the result, after the first quarter of 1944, of eliminating two out of every three CMP 4-B quarterly applications, with authorizations made on an annual basis.

Under the new arrangements, field offices will have increased functions to perform in processing PD-1A applications; industrial projects under $10,000; Emergency Assistance Applications (PD-333); and appeals under WPB orders. In addition, a task committee appointed by Mr. Batcheller is now working with the industry divisions to eliminate the largest possible volume of applications which industry is required to file with WPB. This committee will make a final report to the Operations Council shortly.

Specifically, these are the changes in regional handling of WPB applications:

PD-1A Applications: At present, field processing is limited to applications of less than $500 in value. This authority is now increased to applications up to a value of $1,000, and after 90 days, the authority will extend to applications of a value of $2,500.

Industrial Projects: On October 15, the field offices are scheduled to begin processing applications up to $10,000 in value (excepting certain types of projects), and this authority is to be increased to cases of $25,000 in value or less beginning January 15, 1944.

Emergency Assistance Applications (PD-

British and American Officials at Hercules "E" Ceremony

British government and Hercules Powder Co. officers smile approval at recent Army-Navy "E" award presentation to Hercules-operated Belvidere, N. J., powder plant. Left to right: P. W. Meyeringh, vice president, Hercules; J. H. Barker, Jr., former vice president, N. J. Powder Co.; H. A. Fitzpatrick, former president, N. J. Powder Co. now in purchasing office of British Ministry of Supply Mission; A. H. Snow, British Ministry of Supply Mission; F. J. Saunders, head of Plant Security, British Ministry of Supply Mission; and W. R. Ellis, general manager, and W. C. Hunt, director of operations, both with Hercules Explosives Department.

333)—The Field offices now process PD-333s up to a value of $500. This is to be increased to $1,000 within 30 days, and to $2,500 within 60 days. The authority to grant emergency AAA ratings, however, will remain with the Washington offices for the time being.

Appeals: At the present time, the field offices handle appeals under 60 WPB "L" and "M" orders, and are permitted only to deny such appeals, or to recommend approval; they are not permitted to make outright grants on appeals. Within the next few weeks, 136 additional orders will be referred to the field, with action limited as above on 66 orders, and limited to recommendations for denial or approval on the other 70 orders.

Choose Potash Committee

Five officials of potash producing firms engaged in supplying the fertilizer industry were appointed members of a Potash Industry Advisory committee by the Office of Price Administration. This committee will consult with the Agricultural Chemicals Section of OPA on pricing matters concerning their industry.

Personnel of the committee is as follows: Horace M. Albright, vice-president, U. S. Potash Co., J. B. Grant, chairman of board, Potash Co. of America; William L. Bradley, president, Bradley and Baker; James P. Margeson, vice-president, International Minerals and Chemical Corp.; F. C. Baker, president, American Potash and Chemical Corp.

See Number of Trained Graduates Exhausted

Supply of chemists and chemical engineers is drying up at the source, and within a year or two there will be no more fully trained graduates in these fields, says a report of the Committee on the Professional Training of Chemists. It is impossible, the committee points out, for students to meet the training requirements established by the society within the time limitation of twenty-four months imposed by Selective Service.

"The maximum time now allowed by Selective Service for deferment of students of chemistry and of other fields of technology is twenty-four months," it is explained. "It is the opinion of the committee that the present requirements cannot be met in less than two and two-thirds calendar years which would include eight semesters in an accelerated tri-semester schedule. At present freshmen and sophomore students become eighteen years of age before they are within twenty-four months of graduation and cannot be deferred.

"It is further the opinion of the committee that students who take the Army specialist training courses in chemical engineering or other essential fields should return to college later to complete the standard requirements in order to prepare themselves to be permanently useful in industry or to go on in advanced training."

ASTM Acts on New Standards

Important actions on standards were taken by Committee E-10 on Standards at its meeting on August 30. The committee also had previously approved by letter several important new standards. The number of new specifications and tests including emergency standards totals 17, while 23 standard and tentative specifications were involved in regular and emergency revisions approved by the committee. Of particular significance to the various industrial groups are the following: Comparison test for color of Army motor fuel; three new specifications covering clad plate (stainless sheets bonded to steel plates); several specifications for nonrigid plastics of various compositions; the new hardness conversion tables for steel; and two new emergency specifications for insulated wire and cable with synthetic rubber compound.

Curtail Excessive Orders For Cellulose Plastics

WPB has announced that drastic steps are being taken to reduce the inflated requests for cellulose plastics. On September 2, a special direction was promulgated, pursuant to the provisions of Allocation Order M-326-a, which specified that no person shall place purchase orders with all suppliers for cellulose plastics to be put in process of manufacture during any one calendar month if the amounts covered by such purchase orders exceed the amount he can mold or fabricate within a thirty-day period, commencing from the date of delivery of the subject material.

A recent spot check revealed that fourteen molders, with a capacity of approximately 1,500,000 pounds per month, had placed purchase orders for cellulose plastics for October in excess of 4,000,000 pounds. These fourteen firms will receive total denials, and a downward revision of their declared requirements will be necessary before their applications for material can be reconsidered.

WPB officials advise that similar monthly spot checks will be made as long as the plastics industry fails to cooperate in this effort to reduce the current dangerous inflation. In the face of such inflation, the equitable distribution of any material is impossible, and it is felt that sufficient quantities of cellulose plastics can be made available for good civilian usages, if requests are brought down to the actual consumption level.

Small Plants Get Technical Information Service

A technical advisory service set up by regions throughout the country to serve the interests of small plants has been established by the Smaller War Plants Corporation. The service will put at the disposal of the small manufacturer who requires technical research in the solution of a production problem, information drawn from governmental agencies, trade associations, technical and scientific organizations, technical magazine editors, and the research laboratories of educational institutions and private industry.

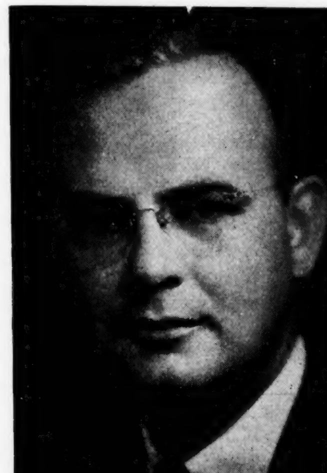
The service itself does not engage in industrial research or testing. It enjoys

Research Director for F. H. Lee

Dr. Ivor Griffith has joined the Frank H. Lee Company as the director of research. Dr. Griffith will continue as the dean of pharmacy at the Philadelphia College of Pharmacy and Science.

New Textile Research Manager

Giles E. Hopkins, who was for many years the technical director of the Bigelow-Sanford Carpet Company, was recently appointed research manager of Textile Research Institute, Inc.



New PLASTICIZERS AND SOFTENERS

Product	Odor	Sp. Gr. 25°C 20°C	Color Hellige	Solidification Point °C	†Approximate Initial Boiling Point °C	Acid Value mg. KOH/g	Water Solubility	% Volatile in 4 Hours at 105°C	Compatibility Ratio (1:4)
*Butyl "Cellosolve" Oleate (S-817)	Mildly Fatty	0.892	8	<-45	355-360	<2	I	0.03	N/C, E/C.
*"Cellosolve" Ricinoleate (S-816)	Mildly Fatty	0.929	7	<-70	340-345	<1	I	0.14	N/C, E/C, P.V.B.
Cyclohexyl Stearate (S-247)	Weakly Cyclohexanol	0.890	3-4	20-22	330-335	<2	I	1.10	N/C, E/C.
Diethylene Glycol Monoricinoleate (S-138)	Mildly Fatty	0.972	5-9	<-60	325-330	<8	I	3.40	N/C, E/C, P.V.B.
Glyceryl Monoricinoleate (S-125)	Mildly Fatty	0.965	6-8	<-50	High	<7	I	1.20	N/C, E/C, P.V.B. Synthetic Rubbers
*Methyl "Cellosolve" Oleate (S-810)	Mildly Fatty	0.899	9-10	<-40	355-360	<1	I	0.34	N/C, E/C.
*Methyl "Cellosolve" Phthalate (S-806)	Bland	1.175	5	<-45	335-340	<1.5	I	0.56	N/C, E/C, C/A. P.V.B.
*Methyl "Cellosolve" Ricinoleate (S-786)	Mildly Fatty	0.935	7	<-60	325-330	<2	I	0.02	N/C, E/C, P.V.B.
*Methyl "Cellosolve" Stearate (S-787)	Mildly Fatty	0.890	2	21	320-325	<1.5	I	0.24	N/C, E/C.
Tetrahydrofurfuryl Oleate (S-804)	Mildly Fatty	0.923	6-9	2-5	330-335	<1	I	0.05	N/C, E/C, V.A.C.
Tetrahydrofurfuryl Phthalate (S-774)	Bland	1.194	12	<-15	——	<4	I	1.20	C/A, N/C, E/C.

CODES

I—Insoluble
N/C—Nitrocellulose
E/C—Ethyl Cellulose
C/A—Cellulose Acetate
P.V.B.—Polyvinyl Butyral
V.A.C.—Vinyl Acetate Chloride Copolymer

†Determined by the Shriner-Fuson Percolator Cup Boiling Point Tube.

*"Cellosolve" is the registered trade name of the Carbide and Carbon Chemicals Corporation.
"Cellosolve"—Ethylene Glycol Monoethyl ether.
Butyl "Cellosolve"—Ethylene Glycol Monobutyl ether.
Methyl "Cellosolve"—Ethylene Glycol Monomethyl ether.

GLYCO PRODUCTS CO., Inc.

26 COURT ST., BROOKLYN 2, NEW YORK, U. S. A.

the voluntary and helpful cooperation of the various government agencies, as well as that of an unlimited number of research laboratories, including those of universities, private institutions and industry. In a few isolated cases, where the nature of the information sought in such that it only can be obtained from commercial testing laboratories or professional service organizations, the technical advisory consultant will recommend several recognized leaders in that field with whom the applicants can discuss cost of service directly. Otherwise Technical Advisory Service is without charge to all small manufacturers.

Set Quota for Cuban Molasses

Imports of molasses from Cuba, Puerto Rico and Santo Domingo for consumption by alcohol manufacturers will be stabilized at 29,000,000 gallons monthly, according to a recent report. Of the total 20,000,000 gallons will be imported through ports north of Hatteras while the remainder will come through Gulf ports, it was said.

While some manufacturers along the Eastern seaboard have estimated that 35,000,000 gallons would be needed monthly to maintain capacity operation of plants, others explained that a rate of imports exceeding 29,000,000 gallons monthly would quickly "clean out" the stockpile in Cuba and the islands.

Chemists Aid Fat Recovery Program

Annual recovery of fats from industrial plants for war use is expected to exceed one hundred million pounds, according to the Fat Recovery Committee of the Chicago Section of the American Chemical Society, which is cooperating in the salvage movement with the War Production Board.

Dr. F. W. Mohlmann, chairman of the committee and director of laboratories for the Sanitary District of Chicago, said that the committee is recommending ways and means of salvaging fats which in many meat packing and processing plants had heretofore gone down the drain. The result, he said, has been maximum recovery of these waste and inedible fats. The committee, after study, has developed simple and relatively inexpensive methods of recovering the fats and is passing the information on to those interested.

National Security Award Established by OCD

The Office of Civilian Defense last month announced establishment of a "National Security Award" to be given to industrial firms in recognition of outstanding achievement in the protection and safety of employees, plants and production schedules from air raids, fire, sabotage and accident. The first plants to receive the new award were the East Pittsburgh plant of the Westinghouse Electric and Manufacturing Co.; the Irvin Works of Carnegie-Illinois Steel Corp. at Pittsburgh; Caterpillar Tractor Corp. at Peoria, Ill.; and the Bethlehem, Pa., plant of Bethlehem Steel Corp.

To qualify for the National Security Award, a plant must meet standards based on its individual security requirements. In other words, a small plant producing essential civilian supplies does not require the same type of security program as a large plant producing secret war weapons. In each case, however, certain basic requirements must be met. These include establishment and adequate training of the five essential protection services—fire forces, air raid wardens, auxiliary police, emergency medical service, and operations and maintenance crews—and enrollment of these protection workers in the Citizens Defense Corps of the community.

Nominations for the award may be made by a local Defense Council or its plant protection officer, by the plant itself, or by the various Federal agencies to which responsibility for security programs in certain plants has been assigned. Public service and utility organizations are eligible for nomination as well as plants producing war materials and essential civilian supplies. Nominations will be received by the local Defense Council, which will transmit them through the State Defense Council, the Regional Civilian Defense Office and thence to national OCD headquarters for final review by a board comprised of representatives of industry and labor.

Socony Vacuum Promotes

Douglas L. Hooker has been appointed a member of manufacturing committee of Socony-Vacuum Oil Co., Inc. Among Mr. Hooker's responsibilities will be supervision of Eastern and, at end of the war, foreign refining operations.

Wage Rulings Clarified

Summarizing new wage stabilization rules on merit increases, Theodore W. Kheel, New York regional chairman of NWLB, explained this month that employers can give workers an average of $2 weekly in merit increases during year without prior approval from WLB so long as they do not give any one employee more than $4 or exceed the top rate of any job classification.

Where an employer has had an established practice of granting merit or length of service increases, which he can prove by written document, the Board has permitted him to continue the practice even though merit limits are exceeded. If proposed increases exceed these rules, employers may nevertheless file application with the Board for approval of adjustment.

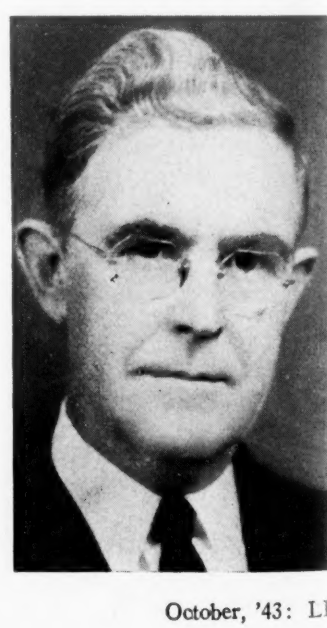
Advisory Committee for N. U. Tech Institute

Eleven of the nation's leaders in industry, education and science have been selected as an advisory committee to guide Northwestern University's palatial technological institute, founded in 1939 by Walter P. Murphy, railway supply manufacturer, at a cost of $6,000,000.

The committee is composed of Charles F. Kettering, chairman; Henry J. Kaiser; Juan Trippe, president, Pan American Airways; James S. Knowlson, president, Stewart-Warner Corp.; Gen. Robert E. Wood, chairman, Sears, Roebuck Company; Ralph Budd, president, Burlington Railroad; Paul E. Klopsteg, president,

President of Lucius Pitkin

Thomas A. Wright, below has been elected president; John Jicha, vice president and chemical director; and Dr. R. H. Bell, vice president, and research director of Lucius Pitkin, Inc.



Central Scientific Company; Karl T. Compton, Massachusetts Institute of Technology; Robert A. Millikan, California Institute of Technology; William A. Wickenden, Case School of Applied Science, and Robert E. Doherty, Carnegie Institute of Technology.

The group will hold its first meeting in December and will concern itself primarily with the program and activities of the institute in the postwar period, according to Dr. Franklin B. Snyder, president of Northwestern. The committee will discuss the position of the engineer in the postwar world, both nationally and internationally. "The results will affect our curriculum and our research work; perhaps even new divisions will be added," Dr. Snyder said.

Achieves 7% Cut in Fatal Accidents

Expansion of safety activities throughout the country under an organized safety program of the National Safety Council reduced the all-accident death toll 7% in the first six months this year, compared with the corresponding period of 1942, according to Col. John Stilwell, president of the council, who reported at the opening session of the thirty-second National Safety Congress.

The rising tide of fatalities through the on-the-job accidents has been checked, despite a 17% increase in man-hours worked and new personnel, Colonel Stilwell asserted. Figures of the Safety Council, too, reveal that casualties to American workers through accidents since Pearl Harbor are 80,000 dead and 7,000,000 injured, on and off the job.

Traffic deaths are down 41%, largely because of wartime traffic restrictions and the public's cooperation.

Explosives plants reduced their accident frequency rate 42% and their severity rate 74% in the first five months of 1943, compared with the same period last year.

Appoint Advisory Committees

War Production Board has announced the formation of the following Industry Advisory Committees.

Metallic Stearates Industry Committee: Government presiding officer: Thomas J. Starkie. Committee members are: William D. Barry, Mallinckrodt Chemical Works; Herbert Bye, M. W. Parsons Imports & Plymouth Organic Labs., Inc.; Dr. D. S. Chamberlin, Warwick Chemical Co.; G. J. Chertoff, Synthetic Products Co.; Joseph M. Franks, Franks Chemical Products Co. Inc.; George A. Isenman, The Beacon Co.; O. E. Lohrke, Metasap Chemical Co. Inc.

Penicillin Producers Industry Advisory Committee:

Government presiding officer: Fred J. Stock. Committee members are: Dr. H. S. Adams, The Upjohn Co.; Elmer H. Bobst, Hoffman LaRoche, Inc.; Dr. Harry Cheplin, Cheplin Biological Labs.; R. S. Childs, Lederle Labs., Inc.; S. DeWitt Clough, Abbott Labs.; Dr. Robert K. Cutter, Cutter Labs.; A. H. Fiske, Eli Lilly & Co.; Kenneth H. Hoover, Commercial Solvents Corp.; James J. Kerrigan, Merck & Co., Inc.; Dr. Theodore G. Klumpp, Winthrop Chemical Co., Inc.; Dr. A. W. Lescohier, Parke, Davis & Co.; Dr. A. J. Liebmann, Schenley Research Institute, Inc.; Carleton H. Palmer, E. R. Squibb & Sons; Dr. John Reichel, Reichel Labs., Inc.; Blythe Reynolds, Heyden Chemical Corp.; John L. Smith, Chas. Pfizer & Co., Inc.; R. Templeton Smith, Ben Venue Labs.

Small Plants Chairman Resigns

Robert W. Johnson, a vice chairman of the War Production Board and chairman of the Smaller War Plants Corporation, has asked to be relieved of his duties because of ill health. Mr. Johnson is president of Johnson & Johnson, surgical manufacturers.

Lists Enemy Magazines

Microfilms, Inc., Ann Arbor, Michigan, has completed its cataloguing of the tables of contents of the enemy periodicals contained in its List No. II. The list is available for $6.00

Instruments Critically Needed

Urgent requests for instruments difficult or impossible to obtain through customary channels continue to reach the Committee on Location of New & Rare Instruments. Many of these can be filled and vital research projects greatly helped if you will do your bit. Particularly

needed are sensitive electrical instruments (milli-and micro-volt and ammeters) and usable optical instruments or parts. Please go over your instruments, and if you have any that you can spare, send a list of them to: D. H. Killeffer, chairman, 60 East 42nd St., New York 17, N. Y. Instruments are requested for both loan and outright purchase.

Requests in the hands of the committee remaining unfilled are:

- Pressure autoclaves
- Cenco impulse counters
- Metallurgical microscopes
- Polarizer and analyzer for microscopes
- Abbe refractometers (16 requests)
- Strobotacs
- L. & N. portable thermocouples

Instruments available through the committee include:

- Various balances
- S. & H. colorimeters
- L. & H. H ion meter
- Microtomes
- pH apparatus
- Polarimeters
- Potentiometers
- Pyrometers
- Hilger-Spekker spectrophotometer
- Viscosimeters

WPB Issues Periodical

New publication, designed to aid business men and Government officials in obtaining information on all products, materials, and service handled by the War Production Board will be issued by WPB every four weeks. The publication, titled "Products and Priorities," will include all information formerly contained in "Priorities" and in "Product Assignments," both of which will be discontinued. A year's subscription of thirteen issues may be obtained for $2.00 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Single issues will be available at 20 cents each.

Persons who now subscribe to "Priorities" will receive the new publication for the balance of their regular subscription. A feature of "Products and Priorities" is a master alphabetical index listing every product, material, or service which comes under WPB supervision or control. This will enable business men and others to determine easily the numbers of any applicable WPB orders and forms, all necessary CMP references, and the WPB Division and section responsible for the product, material, or service.

COMPANIES

Diamond Alkali Expands

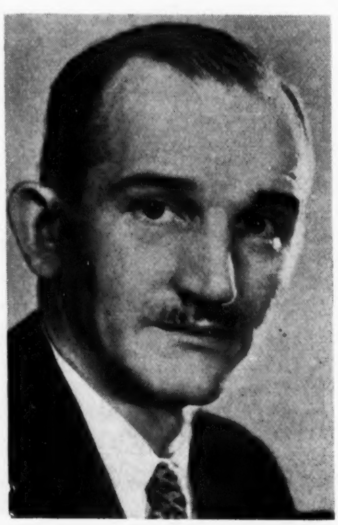
Five heavy chemical distributors became a part of the Diamond Alkali Sales Corporation on October 1, in order to more closely correlate the company's field service, sales and warehousing. In Philadelphia the offices of Consumers Chemical Co., one of the distributors, are located at 12 South Twelfth Street. C. F. Wolters Jr., has been appointed Philadelphia district manager, and G. J. Soren, assistant district manager.

E. A. Jones has been appointed district manager of the territory covered by Tri-State Chemical Co., Inc., with offices at 668 South Main Street, Memphis, Tenn., and a branch at 2307 First Avenue, North, Birmingham, Ala. Sunshine Soda Co., Inc., of Cleveland, Ohio, combined with Diamond Alkali. Its offices are in the Penton Building.

In Omaha, Neb., Central West Chemical Co. became a part of the parent organization, with V. M. Jacobsen as district manager. Offices are in the Redick Tower Building, at Fifteenth and Harney Streets. L. W. Wahl was appointed district manager at Cincinnati where the Buckeye Soda Products Co. became a unit of the corporation. Offices are located at 38 Main Street.

Officials Elected by American Home Products

Knox Ide, left formerly executive vice president, was elected president of American Home Products Corporation to succeed Harry S. Howard. Walter F. Silbersack, right, who was vice president in charge of all advertised products, became executive vice president and general manager.
Mr. Howard previously had been elected president of Wyeth, Inc., new ethical drug company formed as a wholly-owned subsidiary of American Home Products.



Seven Drug Concerns Merge To Form Wyeth, Inc.

American Home Products Corporation is merging seven pharmaceutical, biological and nutritional companies to form a wholly owned subsidiary, to be known as Wyeth, Inc. It will be one of the largest drug houses in the country.

The participants in the merger are John Wyeth & Brother, Inc., eighty-three-year-old Philadelphia maker of pharmaceuticals; the S. M. A. Corp. makers of baby foods; the Reichel Laboratories, Inc., makers of biologicals and penicillin; Gilliland Laboratories, Inc., makers of biologicals; Petrolagar Laboratories, Inc., makers of petrolagar; General Biochemicals, Inc., makers of vitamins, and the Bovinine Co., makers of products for anemia. All seven companies are now subsidiaries of American Home Products and two were acquired in the past year.

Through John Wyeth & Brother the firm will have plants in England, Canada, Argentina, Australia, New Zealand and South Africa.

Harry S. Howard will be president, Frank F. Law, vice president in charge of the pharmaceutical division; Clyde C. Marshall, vice president in charge of the nutritional division, and John Reichel, vice president, in charge of the biological division. Mr. Howard has been president of American Home Products since 1935 but will give up that post to devote his entire time to Wyeth, Inc.

Speaking of the coordination possible under the merger, Mr. Howard declared that it would expedite new research projects. These will include improvement in the process now used for making penicillin, a practicable production process for methionine, a process for dehydration of biological products and work in the still unexplored vitamins of the B complex group, particularly pyridoxine and biotin. The company also hopes to do a good deal of work in mycobiology, with particular emphasis on the use of molds as medicinal agents.

Eli Lilly Forms Subsidiaries

Eli Lilly & Co., manufacturers of pharmaceutical and biological products, has

Director of Employee Relations

A. P. Stover, for several years assistant general manager of Manufacturing Department of Ethyl Corp., has been named director of employee relations, a newly created executive position.

announced formation of two additional subsidiary export corporations—the Eli Lilly Pan-American Corporation and the Eli Lilly International Corporation.

Operation of Eli Lilly Pan-American Corp. will be confined to the western hemisphere outside the continental limits of the United States and Canada and the Eli Lilly International Corp. will cover the eastern hemisphere, with the exception of Britain, executives said.

Officers of Eli Lilly Pan-American Corp. are J. K. Lilly, Jr., president; Forrest Teel, vice-president and general manager.

With the incorporation of these new subsidiaries, the parent company now has in operation four subsidiary organizations. Eli Lilly & Co., Limited, with laboratories in Basingstoke, England, was organized in 1934, and Eli Lilly & Co. (Canada) Limited, in Toronto, Canada, was organized in 1938.

Announces Change of Name

The Porcelain Enamel and Mfg. Co. of Baltimore has changed its corporate title to Pemco Corporation. According to the statement the old title has been somewhat of a misnomer, as the company has entered broader fields of operation.

Offers Film on Welding

Allegheny Ludlum has recently completed a new motion picture "Welding Stainless Steel." Its purpose is to serve as an aid in teaching welding students, as well as welders familiar with carbon steel welding, the fundamentals of working with stainless steels.

This two-reel film, which takes about 25 minutes to show, will be sent without charge, express prepaid, upon valid request by companies, trade or technical groups, industrial schools or colleges. Requests for its use should be addressed to Allegheny Ludlum Steel Corp., Brackenridge, Penna.

Will Assay Amino Acids

Laboratories of Wm. T. Thompson Co., Los Angeles, announce that they are now in a position to supply microbiological assays of the following amino acids:

l—(+)—glutamic acid,
dl—leucine,
dl—valine,
l—(—)—tryptophane,
l—(—)—cystine,
dl—threonine,
dl—isoleucine,
dl—methionine,
l—(—)—tyrosine,
dl—serine,
dl—phenylaline,
l—(+)—arginine.

The company will also assist in the installation of apparatus and operating procedure for those interested.

The following companies have recently been awarded the Army-Navy "E" for excellence in production of war materials.

American Viscose Corp., Fort Royal, Va.

Buffalo Pumps, Inc., Buffalo, N. Y.—Second star added to flag.

General Electric Co., Bridgeport plant, Conn.—Star added to flag.

Hercules Powder Co., home office and Experiment Station, Wilmington, Del.

Hynson, Wescott & Dunning, Inc., Baltimore, Md.—Star added to flag.

Kent Metal & Chemical Works, Edgewater, N. J.

Novocol Chemical Manufacturing Co., Inc., Brooklyn, N. Y.

ASSOCIATIONS

Paint and Varnish Clubs to Hold Annual Meeting

Federation of Paint and Varnish Production Clubs will hold a two-day technical symposium at Hotel Cleveland on October 22 and 23 in Cleveland. According to the announcement this Fall technical symposium comprises a discussion of papers to be presented by the constituent clubs and other work carried on in connection with the war effort. A considerable portion of the program will be devoted to matters concerned with postwar planning and postwar materials from the viewpoints of raw material supply and

use by the industry. Scholarship papers of academic interest will be presented and an open discussion of currently important problems will be held. Prizes will be awarded by the American Paint Journal to clubs presenting the best papers.

Physics Institute Buys Building

The American Institute of Physics has acquired the five-story former residence at 57-59 East Fifty-fifth Street, New York, for national headquarters of the organization and its affiliated scientific societies. A drive is now being conducted by the physicists of America to complete the fund necessary to pay for the building.

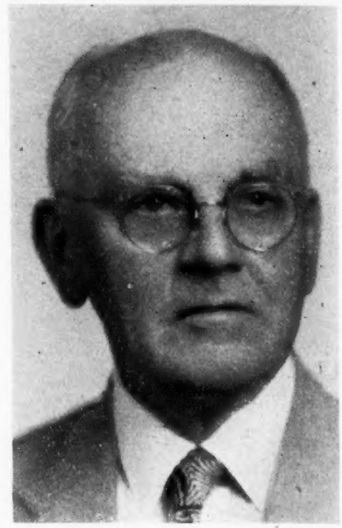
This is the first time that the organized physicists of America have had their own home. The American Institute of Physics has been occupying rented space since its founding in 1931, but the steady growth of the organization in recent years, scientific progress, war work and postwar plans made it advisable for the group to acquire large quarters of its own.

The institute is a federation of national societies, including the American Physical Society, Optical Society of America, Acoustical Society of America, American Association of Physics Teachers and the Society of Rheology. Also associated with the institute are the American Society for X-Ray and Electron Diffraction and the Electron Microscope Society of America. The member organizations and the institute publish eight technical journals.

Forms Scientific Section

The Toilet Goods Association, Inc., has established a scientific section which will expand the work previously done by

Homer S. Burns Retires



After thirty years in sulfur industry which he helped develop from an infant, Homer S. Burns, assistant vice president and power superintendent of Freeport Sulphur Company, is retiring.

the scientific advisory committee and part of the work of the association's board of standards. H. D. Goulden, director of the board of standards, will serve as temporary chairman. Initial meeting of the section will be held in January, 1944.

PERSONNEL

Haigh with Botany Worsted

Frederick R. Haigh, until recently chief of Chemical and Drug Division, OPA, in New York regional area, has resigned to become associated with the Botany Worsted Mills.

Commercial Solvents Personnel Promotions and Additions

At a recent meeting of the board of directors of Commercial Solvents Corporation, Henry W. Denny, vice-president in charge of sales was elected a director of the corporation. Kenneth H. Hoover, manager of Research Department, was elected vice-president in charge of research and development.

Appointments to Commercial Solvents' Research Department include Dr. Ralph E. Bennett, research biologist, formerly with Joseph E. Seagram & Sons; Dr. Alfred R. Stanley, research bacteriologist, formerly instructor of bacteriology in Medical School of West Virginia University; Marlin Alwin Espenshade, mycologist, Purdue University. J. F. Taylor, formerly with the Ansul Chemical Co., has joined the Chicago sales force of the corporation. E. F. Arnold and A. C. Hopkins, Jr., are new members of the Technical Service Division. Mr. Hopkins was technical supervisor for General Chemical Co.

The staff of the Production Division has added four new production supervisors —Robert Harker from Iowa State University. John D. Wells from Purdue University; Donald Larsen, formerly with Hercules Powder Co., and Olin Herner. Recent additions to the engineering staff include project engineers Duncan Thomas, Jr., and Nicholas A. Collora. Mr. Thomas was previously chemical engineer with U. S. Rubber Co.; Mr. Collora was mechanical engineer with M. W. Kellogg.

Nopco Promotions

Dr. Kenneth Morgareidge, head of Nopco's Biological Laboratory for several years, and associate head of the Nutritional Laboratory for the past year, has now been appointed head of the combined Nopco Biological Assay Laboratories. At the same time, Dr. John R. Foy has been appointed assistant head of the same laboratories to fill the vacancy created by the recent resignation of F. D. Baird.

E. M. Toby, Jr., has been elected a vice president of American Mineral Spirits Co. His office is at 155 East 44th St., N. Y.

A. L. Gossman has been elected president of The Dicalite Co., succeeding **C. A. Frankenoff** who became chairman of the board of directors.

Harry Hosier has been appointed vice president of the Corning Glass Works. Mr. Hosier will be in charge of industrial relations for the company's seven plants.

Dr. Samual D. Koonce has joined Innis, Speiden & Co. He will be located at the Boyce-Thompson Institute for Plant Research, Inc., conducting investigations on the application of Larvacide (Chlorpicrin Fumigant) and other substances to the production and protection of foodstuffs.

Margaret V. Donnelly, manager for the past nine years of the U. S. Bureau of Foreign and Domestic Commerce and the Bureau of Census, has resigned to work for Hercules Powder Co. in market research for the advertising and export departments.

Charles T. Jansen, formerly assistant secretary of the Rubber Manufacturers Ass'n, has become associated with Wilmington Chemical Corp. as assistant to E. V. Osberg, vice president. Mr. Jansen will be connected with the firm's sales and promotional activities.

Ludwig I. Florshein, formerly with Tuteur & Co., Inc., has joined Fallek Products Co.

Samuel Cohen has been added to the laboratory staff of Hoffman-La Roche, Inc., as assistant in research.

M. Ernest Graham, formerly associated with Niagara Alkali Co., **has** been appointed to the research staff of Battelle Memorial Institute and assigned to its division of nonferrous metallurgy.

Promoted by Goodrich

Named assistant works manager, Arthur Kelly has supervised the construction of an ordnance plant and four of the government-financed synthetic rubber plants for the B. F. Goodrich Company.

OBITUARIES

Dr. George Bacharach, assistant professor of chemistry at Brooklyn College, died September 20 at Polyclinic Hospital, N. Y., after a month's illness. His age was 44.

Prof. Harry Gray Barbour, research associate in pharmacology and toxicology in the Yale School of Medicine, died in New Haven, Conn., Sept. 23 of a heart attack at the age of 57. He had been ill for several months. Professor Barbour was among the most eminent of American pharmacologists.

Samuel B. Bowen, chairman of the board of directors and former president of Pecora Paint Co., Inc., died of a heart attack Sept. 21 at Manchester, Mass. His age was 88.

J. V. E. Dickson, 49, engineer with E. B. Badger & Sons, died of a heart attack, Sept. 28, in Cleveland.

A. C. Duncan, manager of Hercules Powder Co.'s Paper Makers Chemical office in Portland, Ore., died Sept. 26 after a brief illness. He was in his 67th year.

Hal W. Hardinge, inventor, consulting mining engineer and chairman of board of Hardinge Co., Inc., of N. Y. and Hardinge Mfg. Co. of York, Pa., died Sept. 15 in his home after a long illness. His age was 87.

Harold G. Hobbs, metal process engineer and a district manager of Quaker Chemical Products Corp., died on August 28.

William F. Meredith, president of Titanium Alloy Mfg. Co., died Sept. 28 in his home after a long illness. He was 72 years old.

Dr. Samuel Ruben, 30, an experimental chemist, died Sept. 28 from the effects of an explosion in the chemical laboratory of the University of California. Details were held secret because the experiment "had a direct bearing on the conduct of the war."

Arthur Stockheimer, a chemist with the Linden (N. J.) plant of Carwin Co., died Sept. 15 at the Presbyterian

Hospital, Medical Center, N. Y., after a ten months' illness. His age was 46.

Dr. Charles P. Teeple, vice president and director of research for the Crane Packing Co., died October 5 at Chicago.

Willard H. Tiffany, 48, chief chemist of U. S. Testing Co., died October 10 at Flushing, Queens.

John L. Tildsley, Jr., manager of Chicago branch of Reilly Tar & Chemical Co., died at Chicago Sept. 26. He was 44 years old.

Joel Turnbull, assistant director of sales of explosives department of du Pont de Nemours & Co., Inc., died Sept. 30 in Asheville, N. C., after a long illness. His age was 37.

NEWS OF SUPPLIERS

LUKENS STEEL CO. has appointed George M. Gillen as assistant manager of combined sales for the company and its subsidiaries. Edward K. Myers was elected assistant treasurer of the steel organization.

CONTINENTAL CAN CO., INC., has added Stanley T. Frame to the staff of its sales development department as market analyst. He was previously with Swift & Co., Inc.

COCHRANE STEAM SPECIALTY CO. has appointed Joseph B. Grinnell to its staff. Mr. Grinnell was formerly associated with The Whitty Mfg. Co.

GOULD PUMPS, INC., has announced the promotion of Eric E. Backlund to the post of sales manager. Mr. Backlund has been with the company for the past ten years.

SAVE ELECTRIC CORP. has announced the recent appointment of O. J. Schroeder, to the position of vice president in charge of manufacturing, equipment and engineering. Mr. Schroeder will play an active role in the corporation's expansion of Verd-A-Ray, its new lighting development.

ACME STEEL CO. has promoted two of its executives, Thomas J. Anderson and Frank W. Shymkus to the positions of director of purchases and purchasing agent, respectively.

FARREL-BIRMINGHAM CO., INC., has appointed G. V. Kullgren to the staff of its Akron, O., office. Mr. Kullgren was formerly with General Electric Co., industrial engineering division, where he specialized on the application of electrical equipment in the rubber industry.

AMERICAN CAN CO. has elected R. C. Taylor, vice president of manufacture, a member of the board of directors.

Headquarters for the CLAUDE B. SCHNEIBLE CO. will now be located at their plant at 2827 Twenty-fifth St., Detroit, Mich. Engineering, sales, and production activities have been consolidated at that address.

PRECISION SCIENTIFIC CO. has concluded an agreement with Dr. Tracy C. Jarrett, chief metallurgist of Koppers Co., whereby they have acquired the sole rights to manufacture and market metallurgical apparatus originally developed by Dr. Jarrett and formerly marketed by himself.

INDUSTRIAL TRENDS

Steel: Steel operations for the week beginning Oct. 3 are scheduled at 100.8% of capacity, unchanged from previous week, and the highest rate for the current year, according to the American Iron and Steel Institute. One month ago the rate was 100.3%. In the same week of last year it was 98.6%, up 1.3 points.

Output at the current rate will be 1,756,900 net tons, duplicating previous week's historic high mark, and comparing with 1,748,200 tons one month ago and 1,686,700 tons a year ago.

Electric Power: Electric power production declined for the week ended Oct. 2 when the trend was up, and the adjusted index fell to 152.7 from 153.6 in the preceding week. The figure was 132.1 for the week ended Oct. 3, 1942.

Production totaled 4,359,003,000 kilo-

Glyco Names Plant Manager

Previously assistant superintendent with the Wilson-Martin Division of Wilson & Co., Inc., Louis L. Shapiro has been appointed plant manager of the Glyco Products Company, Inc.

watt hours, compared with 4,359,610,000 in the preceding week and 3,682,794,000 in the like week of 1942. The average increase over last year was 18.4%.

Carloadings: Loadings of revenue freight for week ended on Oct. 2 were 910,643 cars, the Association of American Railroads announced recently. This was 3,332 cars, or 0.4%, more than for the preceding week, 3,357 cars, or 0.4%, more than for the corresponding week last year.

Petroleum: The stock position of the three major oil products along the Eastern seaboard continued to improve during week of Oct. 3, according to the American Petroleum Institute. At the close of the period, the institute's index stood at 44.4, compared with 43 a week earlier and the low point of 25.5 on May 8.

War Outlay: Government war expenditures in August reached a total of $7,529,000,000 for the month, the War Production Board reported.

The month's spending represented an increase of $783,000,000, or 12%, compared with the July total. Compared to June expenditures, however, the month's showing represented a decrease of 2%. From July 1, 1940, through August 31, this year, war expenditures by the United States amounted to $124,000,000,000.

Commodity Prices: The Bureau of Labor Statistics index of commodity prices in primary markets advanced 0.1% in the week ended Oct. 2. A sharp advance in prices for cottonseed meal, together with higher prices for grains, largely accounted for the increase. The all-commodity index rose to 103.0% of the 1926 average, the highest point since early in August.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912 AND MARCH 3, 1933

Of *Chemical Industries*, published monthly except twice in November, at New Haven, Conn., for October 1, 1943.

State of New York, County of New York, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Robert L. Taylor, who, having been duly sworn according to law, deposes and says that he is the Editor of *Chemical Industries* and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corporation, 522 Fifth Avenue, New York, N.Y.; Editor, Robert L. Taylor, 522 Fifth Avenue, New York, N. Y.; Managing Editor, James M. Crowe, 522 Fifth Avenue, New York, N. Y.

(2) That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent. or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Tradepress Publishing Corporation, 522 Fifth Avenue, New York, New York. The stockholders of the Tradepress Publishing Corporation are: John R. Thompson, 2511 Coyle Avenue, Chicago; J. L. Frazier, 2043 Orrington Avenue, Evanston, Illinois; Col. J. B. Maclean, 7 Austin Terrace, Toronto, Ontario; Horace T. Hunter, 120 Inglewood Drive, Toronto, Ontario; The MacLean Publishing Company, Ltd., 481 University Avenue, Toronto, Ontario.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent, or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

ROBERT L. TAYLOR,
Editor.

Sworn to and subscribed before me this 29th day of September, 1943. Philip Baumeister, Notary Public, Bronx County Clerk's No. 33, New York County Clerk's No. 609, New York County Register's No. 347B5. Commission expires March 30, 1945.

Canadian Review

(*Continued from page 545*)

phates and bone ash. Restrictions on the use of tung oil, oiticica, and coal tar have been eased slightly.

The period of wartime industrial expansion is apparently concluding and planning is now largely confined to adjustment and integration of existing manufacturing facilities.

Pyrethrum and Rotenone Restricted

A recent order of the Pesticides Administrator freezes all Canadian stocks of pyrethrum and incorporates the earlier rotenone restrictions in the same ruling.

The Dominion imports most of its pyrethrum direct from Kenya whereas rotenone ordinarily came in through U. S. A. channels. Current stocks of both items are naturally meagre, and official estimates place pyrethrum needs at about 240,000 pounds annually and rotenone requirements at 50,000 pounds.

Casein Production Down

Production of casein in Canada, for the first seven months of this year, was half a million pounds less than in the corresponding period of 1942, and stocks in manufacturing and consumers' hands as of August 1st total one and a quarter million pounds compared with two million pounds on the same date last year.

To date, it has been regarded as more advantageous economically, to route milk to creameries than to cheese or casein producers. However, the Government has announced further subsidization, effective Oct. 1st, which will reverse this position. Emphasis is placed on cheese production and it is apparent that casein supply will not exceed minimum domestic requirements.

Butyl Rubber Fabric

The first commercial unit for the production of butyl rubber impregnated fabric in Canada was placed in full scale operation by Barringham Rubber Co. Ltd. recently. Previously this Company had been the first organization in the Dominion to produce polyvinyl chloride treated fabrics.

The butyl rubber used in current operations is American material, although it is expected that Canadian butyl from the new Sarnia plant will be available soon.

C.I.L. Accident Rate Down

Canadian Industries Ltd., Canada's largest chemical concern, reports the realization of the lowest accident frequency rate in fourteen years. This figure, of 3.51 per million man hours worked, and covering the first six months of this year, was established in spite of the strain of maintaining production at capacity levels, the employment of new and untrained personnel, and the construction of additional manufacturing facilities.

Pidgeon Professor at Toronto

Dr. Lloyd M. Pidgeon, who perfected the dolomite-ferro silicon process for the production of magnesium, has been appointed Professor of Metallurgical Engineering, University of Toronto.

Pioneer in Dye Industry Retires from Du Pont

Lewis S. Munson, who as production superintendent and later plant manager of Du Pont Dye Works played an important part in building the great American dye industry, retired October 1 at age of 70.

He was one of a very small group of American chemists and engineers who had acquired some practical knowledge of synthetic dyestuffs manufacture before the United States' entry into the First World War cut us off from the German dye supply. He was called in to help create a new industry, and his career, therefore, spans the growth of America's synthetic organic chemicals industry.

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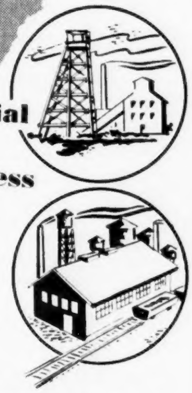

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RESEARCH DIRECTOR

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LEGAL ADVENTURES OF A CHEMIST

Wherein Chemist Smith, mythical chemist-manager of a small chemical manufacturing concern, records for any who may be interested an account of his many and varied adventures with the law.

13. Case of the Hasty Payment

THE SALESMAN checked over Chemist Smith's order for chemicals of various kinds, and other odds and ends.

"Anything else?" he queried.

"No. I've ordered far too much now," Smith demurred.

"How'll we ship?" the salesman queried.

"Oh, just the regular way, and you can draw a 30 day draft, with usual discount if we pay it when presented." Smith directed.

Ten days later the draft arrived at the Electron Bank before the order reached the station.

"Might as well pay that now and take the discount while I've got the ready and available cash," Smith assured himself. He took up the draft and had it stamped "paid." The supplies arrived the next day, and Smith found that the quality was not as represented.

"That stuff isn't worth carting to the factory—looks like the work of a schoolboy chemist," Smith told the agent. He laid the facts before his attorney and instructed him to sue the wholesaler.

"You might have had a cause for action once, which we do not admit, but you're too late now. When you paid the draft you waived any right you had to sue us for damages," the wholesaler contended.

"That might be true if the order had arrived ahead of the draft," Smith's attorney retorted.

And the Ohio courts in the case of Creighton vs. Comstock, 27 O. St., 648, decided that the chemist by paying the draft before he had an opportunity to examine the shipment, had not lost the right to sue for damages for a breach of the original contract of sale.

14. Case of the "Left-Handed" Acceptance

IF CHEMIST SMITH orders say $100 worth of test tubes, and "accepts and receives" part of the tubes, that makes the sale a valid one, all of which is very elementary contract law.

Suppose, however, that Smith accepts part of the tubes, but tells the dealer that he is accepting that many only, and will not accept nor pay for the balance.

"You can't get around the fact that you did accept and receive part of the order," is the dealer's argument.

"But I protected myself by repudiating the sale at the time of the acceptance," Smith said, and the law is in his favor.

"The acceptance of the part was not a sufficient acceptance to take the sale out of the statute of frauds, because it appears that it was not with an intention to perform the whole contract and to assert the buyer's ownership under it," said the Massachusetts Supreme Court in Atherton vs. Newhall, 123 Mass. 141, where the buyer informed the seller's employee who delivered part of the goods that he would pay for the part received and no more.

Largest Rubber Plant Opens

World's largest synthetic rubber plant, with capacity for producing 120,000 tons of man-made rubber annually and built at Port Neches, Texas by The B. F. Goodrich Company is now producing rubber. The giant plant, capable of turning out a fifth of the nation's normal rubber requirements, is the largest to be constructed in the government's synthetic rubber program. B. F. Goodrich will operate two of the 30,000 ton units.

Butadiene for the rubber comes by pipeline direct from the adjoining plant of the Neches Butane Products Co., operated jointly by the Gulf, Texas, Pure Oil, Atlantic and Magnolia Cos. Styrene for Texas rubber will be produced by plants operated by Monsanto Chemical Co. at Texas City and by Dow Chemical Co. at Velasco.

CHEMICAL SPECIALTY COMPANY NEWS

Freon Relief in Near Future

Shortages in the supply of Freon-12 refrigerants will continue for some months, members of WPB's General Refrigeration and Air Conditioning Industry Advisory Committee and of the Industrial Refrigeration Industry Advisory Committee were told at a recent joint meeting. The completion of a new plant in February 1944 will provide some relief, Government officials stated, and there is some possibility that another plant will be built.

The Task Committee appointed to investigate civilian requirements for Freon-12 presented a preliminary report based on existing commercial and industrial refrigeration and air conditioning equipment. Findings indicate that civilian requirements for 1944 will be 11,400,000 pounds. To this figure approximately 2,000,000 pounds should be added, the report stated, to make up for the deficit incurred during the second half of 1943. Civilian requirements for 1945 were estimated at 13,000,000 pounds.

Synthetic Rubber Putty

Plastikon putty, manufactured by The B. F. Goodrich Company and used for glazing and sealing purposes, is now made of synthetic rubber, the company announces. At the present time it is employed chiefly for sealing metal joints in combat equipment.

The new putty, in which man-made rubber entirely replaces natural crude rubber formerly used, is superior to the previous product, according to the manufacturer.

Personnel

Charles M. Rice has been appointed manager of technical development of the Advance Paint Co., Indianapolis. Until this month Mr. Rice was with the War Production Board as assistant to J. W. Raynolds, deputy director of the Chemicals Division. He was previously in the Protective Coatings Section of the Chemicals Division in resins and industrial finishes. Prior to his affiliation with WPB, Mr. Rice was manager of the Cleveland office of the Bakelite Corp.

William A. Green has joined the technical staff of the Hart Products Corp. and will work on problems relating to permanent finishes and pigment colors for textiles. Mr. Green was formerly in charge of research and development for the Sayles Finishing Plants and served as a superintendent in the Glenlyon Print Works Division.

A. J. Bradley, for the past ten years in the industrial soap division of Armour & Co., has joined Prack Laboratories, Inc., New York, as general sales manager. The company has under way an expanded sales program which will include the appointment of representatives in Boston, Philadelphia, Chicago and in the Pacific northwest.

A. E. Bartlett has become associated with Nuodex Products Co., Inc., Elizabeth, N. J., as director of sales service. He was formerly chief chemist of the General Industrial Finishes Division of General Printing Ink Corp. He graduated in chemical engineering from Lafayette College in 1935.

Donald H. Gunther has joined the laboratory staff of the Burkart-Schier Chemical Co. at Chattanooga, Tenn., where he will assist in research and development on textile chemicals and wet-processing agents. Mr. Gunther was in the research department of the Celanese Corp. of America before going to Burkart-Schier.

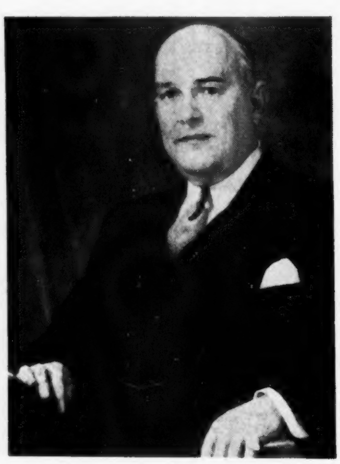
Improve Fire Extinguisher

DuGas Engineering Corp., Marinette, Wis., have developed an improved dry chemical for use in their dry chemical fire extinguishers. Known as "Plus-Fifty DuGas Dry Chemical," the product is now available from DuGas distributors and does not require a priority because critical materials are not used for its manufacture.

Tests indicate that the new chemical has greater fire extinguishing effectiveness than the material formerly used. However, the water repellancy, non-caking, non-corrosive, and non-toxic properties have been retained. The improved product has the same non-conductivity to electricity and thus retains its suitability for use on fires in live electrical equipment. It is approved by the Underwriters' Labs. and the Factory Mutual Labs.

Magnus Portrait Presented to N. Y. Board of Trade

As a tribute to the long and untiring service of Percy C. Magnus, his portrait painted by Edmund McGrath was presented by its members to the New York Board of Trade. Mr. Magnus is chairman of the board of N.Y.B.T.



Borax-Soap Mixture

According to a communication from the laboratories of Borax Consolidated, Ltd., published in the "British Pharmaceutical Journal" of Sept. 4, a washing compound possessing desirable fungicidal properties and yet so mild in its action on the skin as to reduce any tendency to dermatitis, contains approximately 75% borax and 25% dry soap, the borax being in a finely granulated form so that, when mixed with the dry powdered soap, gumming or caking will not take place. Such a product is a good cleanser and will effectively and without waste remove dirt from the hands.

The borax is added, it is stated, not merely as a diluent for the soap, but for the following reasons:—(1) It has a hardness of 2, which correspond with materials softer even than chalk; (2) it is readily soluble, and as the sharp edges of the grains become blunted almost instantly the abrasive action is only temporary. Its complete solubility removes the danger of unhygienic conditions from stoppage of drains sometimes caused by insoluble washing compounds; (3) it has detergent and slight water-softening properties of its own, hence it aids and economizes soap; (4) it is a mild alkaline salt possessing the characteristic property of imparting to a soap solution a *p*H value lower than the soap alone.

The ordinary *p*H of pure soap solution is in the region of 10, that of the washing compound in question is only 9. In other words, the alkalinity of the borax and soap mixture is one-tenth that of pure soap.

The borax-soap mixture has the added advantage of possessing fungicidal properties. For a long time it has been the practice in California to soak oranges in a 5/8% solution of borax, the treatment having proved specific for preventing attack by blue and green moulds. Being familiar with the borax treatment for oranges, a health officer in Central California conceived the idea of using a borax washing compound against the fungus disease of the skin and nails, monila, and has proved it to be an excellent prophylactic.

Summary of War Regulations

Acetone and Diacetone—Placed under allocation control through issuance of Allocation Order M-352, effective for October deliveries.

Acetone and Ethyl Alcohol—Shippers of these items need no longer report intended deliveries in advance on Form WPB 2118.

Alkyd Resins—Because of the improved position of castor oil, phthalic alkyd resins containing castor oil are being approved for most of the uses where soft phthalic alkyd resins are being permitted. This policy was established to permit manufacturers and users of phthalic alkyd resins under Order M-139 additional flexibility in producing protective coatings required for military and essential civilian uses.

Phthalic alkyd resins containing Oiticica oil will be approved under Order M-139 for aircraft coatings (Spec. AN-TT-P-656A). This is to partially compensate for the ban on tung oil in alkyd resins after November 30.

Anti-Freeze—Anti-freezes containing ethylene glycol has been made available for use in passenger automobiles through amendment to Limitation Order L-51. This does not mean that there has been any increase in the amount of available, the WPB announcement said, and heavier vehicles will continue to have first call on existing supplies.

Chromium Chemicals—Order M-18-b as amended September 14, places primary chromium chemicals under allocation control. Exemption is provided for quantities of 100 pounds or less of any single compound.

Coal Tar—OPA has again emphasized that the specific dollar and cents maximum prices established for coal tar on August 20 are subject to all customary discounts and allowances for sales to purchasers of different classes.

Diphenylamine—Preference Order M-75 was retitled "Allocation Order M-75" and revised by WPB on September 30 to provide for the use by suppliers of Standard Allocation Form WPB-2947 and for the use of Form WPB-2945 by customers using 5,000 pounds or more of the product a month. Certificates of use are required from customers using from 50 to 5,000 pounds per month.

Ethyl Acetate—Producers unable to operate under present price ceilings were authorized by OPA as of October 1 to apply for price adjustments. Applicants must show that the present maximum price subjects them to substantial hardship, that a general shortage of ethyl acetate exists, and that the adjustment is necessary to permit them to continue or expand production.

Glycol Ethers—Monomethyl and monoethyl ethers of ethylene glycol placed under allocation control through Order M-366 effective November 1.

Inventory Restrictions—Silicate of soda, sodium carbonate (soda ash) and sodium hydroxide (caustic soda) were removed from Schedule A of General Inventory Order M-161 on September 30 by amendment of the order. Schedule A lists materials which are not subject to inventory restrictions. The amended order added phosphate rock and sulfur to Schedule A, applying the inventory restriction exceptions to these materials. Simultaneously two General Inventory Orders, M-149, governing phosphate rock, and M-132 governing sulfur, were revoked.

Ipecac—Placed under allocation through Order M-350, effective November 1. Applies also to the ipecac derivative, emetine.

Methyl Salicylate—Specific ceilings established for producers, primary distributors and resellers of methyl salicylate except for that obtained by distillation from birch and wintergreen, at levels generally prevailing for producers since 1938, with specific markup for resellers. Amendment 2 to MPR-353, effective September 30. Retail sales remained under GMPR.

Laboratory Chemicals—Preference ratings on deliveries of reagent chemicals for laboratory use were reassigned September 28 by WPB through issuance of Preference Rating Order P-135 amended. Preference Rating AA-1 is assigned to deliveries of any reagent chemical to any laboratory to which a serial number has been assigned under Preference Rating Order P-43, governing laboratory equipment, and to any laboratory owned and operated by the Army or Navy. Preference Rating AA-2 is assigned to deliveries of any reagent chemical to any laboratory lacking a serial number under Order P-43 or to a distributor or producer of reagent chemicals. Order P-135 formerly assigned a blanket rating of AA-2X to reagent chemicals for laboratories.

Lanolin—Specific dollars and cents ceilings for sales by primary distributors and wholesalers were established September 29 by OPA through Maximum Price Regulation 474. Ceilings for producers of lanolin are covered by another regulation—MPR 53—and retailers ceilings continue as established by the G. M. P. R. The new ceilings generally reflect prices currently quoted.

Linseed Oil—Maximum prices approximately equivalent to ceilings established for 100 per cent linseed oil were set September 27 by OPA for linseed replacement oil conforming to federal specifications designed to provide a substitute with similar serviceability.

Maleic Anhydride and Maleic Acid—Placed under allocation control through addition to Order M-214, which formerly controlled only phthalic anhydride. Exemption is authorized for quantities of not more than 700 pounds of phthalic anhydride, 500 pounds of maleic anhydride and 200 pounds of maleic acid in any month.

Operating Supplies—As a result of an amendment to Order P-89 issued September 28, chemical producers will no longer have to apply for regular quarterly quotas of maintenance repair and operating supplies after January 1, 1944. Instead of making applications for each quarter, producers will instead be automaticallyy granted in 1944 the same amount of material which they purchased for MRO in 1943, and the amended order assigns a blanket AA-1 preference rating and allotment symbol MRO-P-89 to purchase orders on and after January 1st. The order provides, however, that no producer may assign the preference rating or allotment symbol "to any order for fabricated parts or equipment having a unit cost of $500 or more, or to purchase orders placed during any calendar quarter for an aggregate amount of aluminum in any of the forms or shape constituting a controlled material in excess of 500 pounds." Nevertheless, if the producer is unable to obtain necessary MRO materials because the preference rating or allotment number is insufficient or because his quota or cost limitation would be exceeded, he may apply to WPB for a special rating. The order outlines 13 specific points on which information must be filed to obtain the special rating.

Polyethylene—Placed under allocation through issuance of Allocation Order M-348, effective October 1. Amounts of not more than five pounds per month per customer are exempted.

Potassium Chlorate—Temporary ceilings for potassium chlorate produced and sold by new manufacturers were established by OPA on September 16. The new ceilings range from 10¾ cents per pound for contract sales of 20 tons or more to 12 cents per pound for sales of less than a ton.

Pressure Vessels—More than 2,600 dollars and cents prices for 1,300 sizes and combinations of used pressure vessels

(*Turn to Page 574*)

Tri-Sure News

NUMBER 10 ★ 30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK ★ OCTOBER, 1943

THE ALEUTIAN ISLANDS

Aleutian Islander

From "We Were There"—An Autobiography of the Tri-Sure Family

Outside the rain beat on the window panes and the traffic rumbled past, but to the assembled gathering these noises seemed like off-stage effects to the stories, related with pride, of the part our family was playing in the greatest drama the world has ever seen.

"I remember a morning last May." A quiet member of the family circle spoke, whereupon we all turned our attention to him. "We were in the Aleutians and the attack on the Island of Attu was in progress. Hour by hour our planes roared away from the base and returned for more bombs and to refuel. Some did not return and we knew that search for them would be futile, for to land in the water meant almost instant death from freezing in that part of the world.

"A plane approached the field, flying low. As we watched we saw how it wobbled in its flight, its flying speed almost gone. It was a miracle it stayed in the air.

"Slowly it came in until its wheels touched the ground and it rolled to a standstill. How it ever returned no one seemed to know. Gaping holes showed in the wings and the fuselage, while the tail was almost completely shot away.

"The crew tumbled out and stood and surveyed their wounded 'War Horse'; then, with a grin, turned away. One was heard to say, 'Thank God, the last engine didn't give up the ghost.'

"Looking over at the gasoline dump he saw the drums laying out in the open. Some had water on the top; some had snow, but the closures were all sealed, thus safeguarding the contents. The pilot patted one of the seals as he passed and muttered, 'You're worth your weight in gold, Buddy.' "

The quiet member stopped talking and his audience sat a long time thinking over his words.

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The excerpt above is from "We Were There," a modern odyssey that carries the reader through history-making exploits in Africa, the Pacific, Tunis, the Aleutians, Java and Alaska. It is profusely illustrated with original portraits of Winston Churchill, General Chiang Kai-Shek, General Carl Spaatz, General Sir B. L. Montgomery, Lt. Col. Jimmy Devereux, and pencil studies of natives of Tunisia, the Aleutians and Java. A copy of the De Luxe Edition, beautifully bound, will be sent free upon request. Just mail the coupon.

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MARKETS IN REVIEW

INDUSTRIAL production, a reliable yardstick of chemical consumption, forged ahead to a new peak level for the war in August, and there is reason to believe that the upward swing continued throughout September. The production lag which had caused some concern in military branches between May and August evidently has been broken.

The Federal Reserve Board's production index moved up from 205 in July to a preliminary figure of 207 in August, with durable goods production leading the way. Munitions output, in which chemicals figure prominently, meanwhile continues to expand but at a slower rate of gain than was the case earlier in the war, a circumstance which must be attributed to the full utilization of capacity, plus cutbacks. Notwithstanding, the WPB munitions index for August, at 618 points, shows that production in this branch has increased six times since the pre-Pearl Harbor month of November, 1941. August arms output gained 5 per cent over July.

It would not be correct to conclude that chemical production has been permitted to rise steadily without interruption, even though military requirements have been fully met. Plant breakdowns have been a factor in some branches of the heavy chemical field, and the supply of ethylene-derived solvents was affected by precautionary shutdowns in the hurricane areas of the Southwest during September. At the start of October, the WPB stated that shortages created by these conditions in chlorine, caustic soda, soda ash and some other essential chemicals had been corrected, and that supplies again would move in a short while to less essential consumers.

Metallurgical lines to an extent have felt the temporary shortages in caustic and soda ash. The latter is of particular importance to the aluminum industry, and representatives of the latter evidently sought assurances of a continued supply of alkalies in a recent conference with the WPB Chemicals Division. Magnesium production at the same time appears to be approaching a total where greater consideration may be given to its use in aircraft structural parts such as forgings and castings, over and above the amount entering incendiary devices, flares, etc. Magnesium production is approaching the 500,000,000-pound annual mark.

Processors of metal products have been granted larger quantities of potassium chemicals despite the fact that our large domestic supply of potash has to be carefully distributed as between fertilizer, metallurgical and chemical-consuming lines. The new potash allocation to the latter two industries is 85,000 tons for the year ending June 30th, 1944, an increase of 17,700 tons over the previous annual allotment. Almost the same amount is being set aside for the United Kingdom, Canada, Latin America, while the United States mainland and nearby possessions are allocated 540,000 tons. The 1943-1944 potash production is placed at 700,000 tons.

Munitions and explosives programs evidently are still being pared and trimmed after the first cutbacks were announced earlier in the summer. Non-munitions plants naturally have expected to benefit by obtaining supplies of sulfuric acid, toluol, phenol, nitric and chlorine ruled out through the cutback procedure. As far as can be ascertained, however, the revised munitions set-up has not released any considerable tonnages of these basic chemicals to indirect military or civilian users. In fact, about the only assurance is that more sulfuric, fuming sulfuric or oleum probably excepted, will move into superphosphate manufacture for the fertilizer trade.

WPB officials indicate that the munitions cutback will not ease the situation in chlorine, although this is far less definite. It is more likely that additional chlorine capacity accounts for the increase in supplies reported at the end of September. The paper industry is among several consuming lines that could use more chlorinating agents. This industry in some respects has a unique war record in that not one mill has been forced to shut down since Pearl Harbor for want of critical materials. Through the erection of new phenol capacity in the South, paper manufacturers in that region will obtain larger supplies of sodium sulfate, however. The new plant, located at Tuscaloosa, Ala., will process benzol into phenol through sulfonation, and the resulting by-product sodium sulfate will be sold to paper mills.

Rubber manufacture already has embarked upon a new era of technology created by the synthetics, and the contributions of the rubber chemist have been publicly acknowledged by those in charge of the Government's rubber program. The industry, however, faces some formidable difficulties in manpower and equipment in manufacturing the tires needed to maintain essential transportation as well as other rubber goods, in addition to heavy tires required for military airplanes, trucks and combat vehicles. The manufacture of heavy bus and truck tires from synthetic that will stand up under punishment is another problem to be licked. Rayon is needed in much greater quantities also for the rayon cord tire, and this question unfortunately has been seized upon by the farm politicians for a rayon versus cotton argument. In the sober judgment of WPB Chairman Donald Nelson, the 1944 tire program is threatened seriously by inadequate supplies of both rayon and cotton. Shipments of rayon filament yarn to mills dropped 1,000,000 pounds between August and September.

Pharmaceutical and drug manufacturers as a general thing are in a better position as regards chemicals and raw materials than was true about a year ago. The Office of Price Administration already has boosted the allotment of sugar to drug manufacturers from 70 per cent to 100 per cent, and the War Food Administration more recently has increased the allocation of glycerin for the same industry to 100 per cent of base requirements. Yet the WPB admitted during September that serious shortages face the cosmetic and drug makers in other essentials. The alcohol allotment for cosmetics has not been increased and will not be in the future, and the only hope held out to the drug people is that some appeals in unusual hardship cases may be granted if the alcohol supply picture improves.

More phenol is being made available than in 1934 for the manufacture of salicylates, a group which includes aspirin, and production is being upped further. Totaquine has been designated more or less as the civilian antimalarial. It is a product of mixed alkaloids made from South American cinchona barks low in quinine content. Atabrine or quinacrine is also supplied in ample quantity for civilians. The WPB offers no figures to lighten the darkness thrown over the antimalarial situation, but trade estimates indicate that further rapid progress has been made in producing atabrine. By pressing dyestuff and other synthetic organic plants into atabrine intermediate production, the supply this year will be brought up to some 2½ billion tablets or doses, a thousand-fold increase over the amount produced before we entered the war.

Heavy Chemicals. Extremely short supplies of caustic soda overshadowed all else in a market that is afflicted with many shortages. At one time last month deliveries of caustic were reported running 60 to 90 days behind schedule, and that the deficiency at times was greater than anything experienced heretofore in this industry. Factors in the situation were that lack of manpower and the obligation placed upon the alkali makers to set aside percentages of their production for Lend-Lease shipments. Caustic potash is another

important chemical which developed a shortage in September, a situation which stems from a 20 per cent reduction imposed upon potassium chloride employed in the manufacture of caustic potash. Direct Government and Lend-Lease requirements will take 55 per cent of current production in the latter, indicating a continued tight situation over the remainder of the year. Government needs also are creating a shortage in barium chloride, sales in which are reported up to $100 and $125 per ton in the dealer market, compared with producers' prices of $77 to $88. Limited supplies are also the rule in such necessities as acetic acid, phosphates, chrome chemicals, sodium acetate and fluorides.

Fine Chemicals. The solvents picture grew less assuring and confused last month. Acetone went under allocations as requirements for British cordite here grew heavier and those for acetate rayon and plastics remained large. Production via isopropyl alcohol was affected by hurricane shutdowns at Southern plants working natural gas, and despite the fact that we have expanded acetone-making capacity some four times since the prewar period, another shortage confronts the industry. The Government also has failed thus far, due to a dispute with Cuba over prices, to assure the alcohol plants here of a blackstrap molasses supply during 1944. The Cubans also would prefer to make their own alcohol and send it here at favorable prices rather than supply molasses which is tied to a low price for sugar. Conflicting bureau controls over shipping are also mixing up the situation, as is the offer of the Commodity Credit Corp. to loan 6 cents a gallon on Puerto Rican molasses when the market is 3 cents to 4 cents at the plantation.

Methanol has been moved out in volume to the anti-freeze distributing trades, and the WPB some time ago relaxed restrictions on ethylene glycol as to permit its use in passenger cars. There evidently will be no additional citric acid for the food, flavoring and extracts industries, and these consumers were urged by the War Food Administration to use other acids and lemon oil instead—supplies of the latter are exceedingly tight. Citric, however, will be made available for sodium citrate, iron and ammonium citrate, and citrated caffeine. Sulfanilamide and sulfadiazine are in fairly liberal supply, and sulfathiazole is in ample supply. Hard-to-get items include alcohol, cream of tartar, menthol, solvent ethers, chlorine and all coal tar derivatives. Stocks of Vitamin A in oils and concentrates dropped some 6,000,000 million units recently.

Coal Tar Products. The position of the civilian and indirect military consumer of coal tar solvents promises to be an unenviable one from this point on. Benzol and toluol have become so definitely war chemicals that their former users were forceed to switch to xylol. And now xylol is shortly to be taken out of the market for all industrial uses. Benzol allocations will probably be restudied and revised in order to send more into styrene for synthetic rubber and high-test aviation fuels. The demands for toluol for TNT and other high explosives has relaxed to an extent, but not enough to benefit industrial consumers greatly. A new outlet for the intermediate metacresol may be created by the synthetic process for menthol, former Far Eastern product. All other coal tar intermediates are scarce.

Paint Materials. An easier supply situation developed in castor oil although dehydration facilities for providing drying oil limit production. Increasing quantities of casein also are arriving from Argentina, but many other paint materials are in diminishing supply, including the oils. Producers are finding it difficult to meet delivery schedules in titanium dioxide, barium and calcium pigments. Three principal producers of titanium are endeavoring to make up a supply deficiency caused by the suspension of production by a fourth, and the reimposition of an industry-controlled allocations system, rescinded in July 1942, is proposed. Sharp price upturns took place in gum rosins during the month, especially in waterwhite and windowglass, government stocks of which are said to be exhausted. Equally marked advances took place in steam distilled wood turpentine. Price controls meanwhile are under study by the OPA for the gum naval stores industry, and a meeting with producers is scheduled for some time in October. The supply of carbon black, 249,144,000 pounds at the close of August, are believed ample for both the paint and rubber industries.

Nitrogen Compounds in 1942

About 500,000 short tons of nitrogen, in one compound or another, were consumed in this country annually in normal prewar times—nearly 400,000 tons in agriculture and the balance in industry. The war has increased the domestic need for nitrogen for both agricultural and industrial purposes far beyond productive capacity or importation possibilities, according to the Bureau of Mines, and the result has been a general shortage.

The United States has never been self-sufficient in nitrogen, only about 70% of consumption coming from domestic plants before the war. The domestic demand for nitrogen was ordinarily met by the fixation of atmospheric nitrogen, the recovery of nitrogen as a by-product of coal distillation, and the importation of nitrogenous compounds, chiefly nitrates from Chile, cyanamide from Canada, and ammonium sulfate from Europe and Japan, supplemented by various organic nitrogenous compounds of domestic and foreign origin used exclusively in fertilizers. The war cut off some imports, injured the importation of other commodities, and totally upset the domestic nitrogen economy. Agriculture attempted to turn to organic nitrogenous material for fertilizer use, and new synthetic nitrogen plants were started to satisfy the demand for explosives.

To partially relieve the situation, the country was able to draw in 1942 from a stockpile of Chilean nitrate started in Chile in 1941 by the U. S. government. All Chilean nitrate imported from July 1, 1942, to the end of the year was for the account of the Defense Supplies Corporation.

Production of synthetic ammonia at private and government plants is reported to have made an all-time record in 1942. Domestic capacity for the production of synthetic ammonia is being vastly increased. Several new plants have been erected and others are in the process of erection. It is reported that eventually there will be synthetic ammonia plants in ten or more states.

Washington

(*Continued from page 444*)

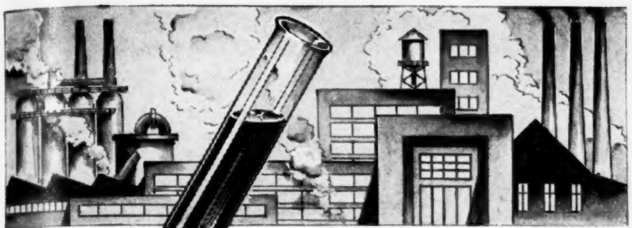
from present chemical allocations. For these reasons, the Chemical Division has recommended continued allocation of the products on the critical list, rather than change over at this time.

Export Controls

Some time earlier in the year, criticism was heard in Congress of certain export control practices which it was charged, handicapped American chemical exports, particularly on East Indian and Latin American markets. Whether intended as a remedy to some of the conditions complained of is not clear, but the Office of Economic Warfare has worked with the State Department recently in relaxing export controls to a marked degree, particularly in regard to exports to Latin American countries. These modifications, extending to Latin American exports, become effective October 1.

In substance, the changes remove from United States export control all those commodities in free supply in the United States. Individual export license and foreign import requirements controls are retained only for goods subject to WPB allotment, quota, allocation or release.

The modifications apply to exports to 16 Latin American countries, and to lists of commodities which have been forwarded to shippers in connection with the order.



War Regulations

(Continued from page 568)

sels and used enclosed atmospheric pressure vessels were established September 15 by OPA to replace formula ceilings for these items. Generally the specific maximums reflect the March 31, 1942 level of prices.

Protective Coating Materials—The following procedure must be followed by manufacturers who desire to export protective coatings or raw materials used in protective coatings under Office of Economic Warfare licenses:

1. If the item to be exported is the finished paint, varnish, or lacquer, license application Form BEW-119 must be submitted in quadruplicate to the Chemicals Section, Chemicals and Health Supplies Division, Office of Exports, Office of Economic Warfare. The manufacturer must further submit to OEW end-use information insofar as possible, and state the types of paint, varnish, or lacquer in question. In addition the principal components which are under WPB allocation should be shown.

2. To obtain the allocated raw materials required for producing the paint, varnish, or lacquer to be exported, the manufacturer must show on WPB-2945 forms filed with the War Production Board the export license number granted by OEW. No allocation of raw materials will be made until this license number is obtained.

3. Where manufacturers desire to export allocated raw materials for producing protective coatings in a foreign country, the required WPB-2945 or similar forms must be sent directly to the Office of Economic Warfare together with license application Form BEW-119 in quadruplicate. When the license application has been approved, OEW will send the WPB-2945 forms to the War Production Board for allocation.

Sodium Metasilicate—Plans for placing distribution under allocation on November 1 were discussed early in October in Washington, D. C., by manufacturers of that chemical. The proposed order will be similar to the phosphate allocation order, under which the consumer or primary distributor reports only once to WPB, listing requirements for use and resale for the last two years by quarterly periods.

Zinc—Use of zinc for making items not specifically prohibited in List A attached to Conservation Order M-11-b is now set at 15 per cent by weight per quarter of the amount of zinc products used by consumers during the entire calendar year of 1941. This was accomplished through revision of Order M-11-b effective October 1. The order previously permitted processing during a quarter of 50 per cent of the amount of zinc used in the corresponding quarter of 1941.

Erect Plant to Increase Plasmochin Manufacture

A new $75,000 building to be devoted exclusively to the production of plasmochin, an antimalarial, is being constructed by Winthrop Chemical Co. at Rensselaer, N. Y.

In announcing that completion of the structure was scheduled for September 15, with operations to begin about November 15, Dr. Theodore G. Klumpp, president, declared it would increase the company's plasmochin production capacity by 300 per cent.

For the production of penicillin a building outside the factory grounds was recently leased, where operations are scheduled to begin shortly.

PRICES CURRENT

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00 Sept. 1941 $1.017 Sept. 1942 $0.930 Sept. 1943 $0.902

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv (*PC*) ..lb.	...	.07	...	.07	.07	.158
ACIDS						
Acetic, 28%, bbls (*PC*) 100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. ....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks ......100 lbs	...	6.93	...	6.93	6.25	6.93
Acetylsalicylic, Standard USP ....lb.	.40	.54	.40	.54	.40	.40
Benzoic, tech, bbls ......lb.	.39	.43	.39	.43	.43	.47
USP, bbls ....lb.	.54	.59	.54	.59	.54	.59
Boric, tech, bbls, c-l, ..ton *a*	...	109.00	...	109.00	108.00	109.00
Chlorosulfonic, drs, wks ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, crys, gran, bbls, c-l lb.*b*	.20	.24	.20	.24	.20	.21
Cresylic 50%, 210-215° HB, drs, wks, frt equal (A)gal.	.81	.83	.81	.83	.81	.86
Formic, Dom. cbys ......lb.	.10½	.11½	.10½	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. ....lb.	.08	.09	.08	.09	.06	.06½
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks lb	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs lb	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys ...100 lb.	1.50	2.45	1.50	2.45	...	...
20° cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	1.75	1.75
22° cbys, c-l, wks ..100 lb.		2.25	...	2.25	2.25	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	5.00	5.95	5.00	5.95	5.00	5.00
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	5.50	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	6.00	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	6.50	6.50
Oxalic, bbls, wks (*PC*) ..lb.	.11¼	.12½	.11¼	.12½	.11¼	.14½
Phosphoric, 75% USP, ..lb.	.10½	.13	...	.12	.12	.12
Salicylic, tech, wks (*PC*)..lb.	.26	.44	.26	.44	...	.33
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks ....ton	...	16.50	...	16.50	...	16.50
Fuming (Oleum) 20% tks. wks ....ton	...	19 50	...	19.50	...	19.50
Tartaric, USP, bbls ......lb.	...	.70½	...	.70½	...	.70½
Alcohol, Amyl (from Pentane) tks, delv lb	...	.131	...	.131	...	...
Butyl, normal, syn, tks (PC) ....lb.	...	.10¾	...	.10¾	.10¾	.168
Denatured, CD, 14, c-l drs, (*PC, FP*) ...gal. *a*	...	.54½	...	.54½	...	.65
Denatured, SD, No. 1, tks. *a*	...	.50	...	.50		.53
Ethyl, 190 proof tks... gal	...	11.90	...	11.90	8.12	11.92
Isobutyl, ref'd, drs .....lb.		.086		.086		.086
Isopropyl, ref'd, 91% gal	.39	.66½	.39	.66½	.40½	.43½
Propyl, nor, drs, wks gal	.67	.70	.67	.70	.69	.75
Alum, ammonia, lump, bbls, wks ....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum metal, (*FP*) 100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd 99% wks lb.	.08	.12	.08	.12	.08	.12
Hydrate, light, (A) ....lb.	.14½	.15	.14½	.15	...	.14½
Sulfate, com, bgs. wks 100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks ....100 lb.	2.35	2.50	2.35	2.50	1.75	1.85
Ammonia anhyd, 100 lb cyl lb.	...	.16	...	.16	...	.16
Ammonium Carbonate, lumps, dms ....lb.	.08½	.09¼	.08¼	.09¼	.08¼	.09¼
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	...
Nitrate, tech. bags. wks. lb.	.0435	.0850	.0435	.0850	.0435	.0455
Oxalate pure, grn, bbls..lb.	.27	.33	.27	.33	.27	.33
Perchlorate, kgs (A) ...lb.	.55	.65	.55	.65	.55	.65
Phosphate, dibasic tech, bbls ....lb.	.07¼	.08½	.07¼	.08½	.09¼	.09¼
Stearate, anhyd, dms ...lb.	...	.34	...	.34	...	.24½
Sulfate, f.o.b., bulk (A) ton	28.20	29.20	29.00	30.00	29.00	30.00
Amyl Acetate (from pentane) c-l, drs, delv ....lb.	...	.18½	...	.18½	...	...
Aniline Oil, drs ....lb.	.11½	.12½	.11½	.12½	.12½	.16
Anthraquinone, sub, bbls..lb.	...	.70	...	.70	...	.70
Antimony Oxide, 500 lb. bbls (A) ....lb.	.15	.15½	.15	.15½	.15	.16½
Arsenic, whi, kgs (A)....lb.	.04	.04¾	.04	.04¾	.04	.04¾
Barium Carbonate precip, 200 lb bgs, wks ....ton	55.00	65.00	55.00	65.00	55.00	65.00
Chloride, delv, zone 1..ton	77.00	90.00	77.00	90.00	77.00	92.00

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs. less in each case; *d* Prices given are Eastern schedule. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric is ½c higher;

Current Prices

	Current	Market	1943 Low	1943 High	1942 Low	1942 High
Barytes, floated, bbls. ....ton	...	36.00	...	36.00	...	...
Bauxite, bulk mines (A) ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, cbys, dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal	(A)	.15	(A)	.15	...	.15
Benzyl Chloride, cbys ....lb.	.22	.24	.22	.24	.22	.24
Beta-Naphthol, tech, bbls, wks ....lb.	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots...lb.		1.25	...	1.25		1.25
BlancFixe, Pulp, bbls, wks ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.60	2.50	3.60	2.25	3.10
Borax, tech, c-l, bgs ....ton *i*	...	45.00	...	45.00	45.00	46.00
Bordeaux Mixture, drs . lb	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ...... lb.	.25	.30	.25	.30	.25	.30
Butyl, acetate, norm drs, lb.	...	.1575	...	.1575	.124	.168
Cadmium Metal (*PC*) .lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs. 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs (A) c-l ....lb.	...	.04¾	...	.04¾	...	.04¾
Carbonate, tech, c-l bgs, ton	18.00	22.00	18.00	22.00	16.00	20.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	...	21.00
Solid, 73-75% drs, c-l, ton	18.00	31.50	18.00	34.50	18.00	34.50
Gluconate, U.S.P., drs. lb.	.57	.58	.57	.58	.52	.59
Phosphate, tri, bbls. cl ..lb.	...	.0635	...	.0635	.0635	.0705
Camphor, U.S.P., gran, powd, bbls ....lb.	.68	.70	.68	.70	...	...
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, Liq, 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, (*FP*) (*PC*) cl, Zone 1, 52½ gal drms ....lb.	.73	.80	.73	.80	.73	.83
Casein, Acid Precip, bgs, 100 or more ....lb.	...	.24	...	.24	.15	.30½
Chlorine, cyls, lcl, wks, contract (*FP*) (A) ....lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract ..lb. *j*	...	.05¾	...	.05¾	...	.05¾
Liq, tk, wks, contract 100 llb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs ... lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude ....bbl.	8.25	8.75	8.25	8.75	7.50	9.25
Cobalt Acetate, bbls (A) lb.	...	.83¼	...	.83¼	...	.83¼
Oxide, black kgs (A) . lb.	...	1.84	...	1.84	...	1.84
Copper, metal *FP*, *PC* 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls lb.	.19½	.20	.19½	.20½	.18	.20½
Sulfate, bbls, wks (A) 100 lb.	5.00	5.50	5.00	5.50	5.15	5.50
Copperas, bulk, c-l, wks ..ton	...	14.00	...	14.00	...	17.00
Cresol, USP, drs, (A) ....lb.	.10¾	.11¼	.10¾	.11¼	.10¾	.11¼
Cyanamid, bgs, c-l, frt (A) ....ton	1.52½	1.62½	1.52½	1.62½	no prices	
Dibutylamine, c-l, drs. wks lb.	...	.61	...	.61	.50	.61
Dibutylphthalate, drs .....lb.	.2180	.2230	.2180	.2230	.21	.23½
Diethylaniline, lb drs . lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs lcl. wks. lb.	.14	.15½	.14	.15½	.14	.15½
Dimethylaniline, dms., cl., lcl. lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs ..lb.	.1970	.2050	.1970	.2050	...	.20
Dinitrobenzene, bbls .....lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls .....lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms .....lb.	...	.18	..	.18	...	.18
Diphenyl, bbls lcl. wks ....lb.	.16	.20	.16	.20	.15	.16
Diphenylamine bbls .....lb.	...	.25		.25		.25
Diphenylguanidine, drs ...lb.	.35	.37	.35	.37	.35	.37
Ether, Isopropyl, drs ....lb.	.06	.06½	.06	.06½	.07	.08
Ethyl Acetate, 85% Ester tks, frt all'd ....lb.	.107	.110	.107	.110	.11	.12
Chloride, drs ....lb.	.18	.20	.18	.20	.18	.20
Ethylene Anhydrous frt all'd ....lb.	...	.75	...	.75	...	.75
Dichloride, cl wks ....drs, E. Rockies dms, cl. ..lb.	...	.0842	...	.0842	...	.0742
Glycol, dms, cl. .... lb.	...	.10	...	.10	.14½	.18½
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines ....ton	...	37.00	...	37.00	...	...
Formaldehyde, c-l, bbls, wks (*FP*, *PC*) ....lb.	.055	.0575	.055	.0575	.055	.0575
Furfural drs, c-l. wks ....lb.	..	.12½	..	.12½	..	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18	.19½
Glauber's Salt, bgs, wks 100 lb.	1.05	1.25	1.05	1.25	1.05	1.28
Glycerin (*PC*) CP, drs, c-l, lb.	...	.18¾	...	.18¾	...	.18¾
Saponification, drs, c-l, lcl or tks ....lb.	...	.12¾	...	.12¾	...	.12¾

GUMS

	Current	Market	1943 Low	1943 High	1942 Low	1942 High
Gum Arabic, amber sorts bgs ....lb.	.14½	.15	.14½	.15	.14½	.24
Benzoin Sumatra, CS ....lb.	.60	.65	.60	.65	.45	.55
Copal, Congo, ...lb.	...	.55¾	...	.55¾	...	...
Copal, East India, ...lb.	...	.12	...	.12	...	...
Macassar ....lb.	.07⅜	.11¾	.07⅜	.11¾	...	.17⅜
Copal Manila,	.13½	.15½	.13½	.15½	.14	.14½
Copal Pontianak, bold (A) lb.	...	.23⅜	...	.23⅜	.22⅜	.22⅜
Ester ....lb.	.09½	.12	.09½	.12	.08½	.10
Karaya, bbls, bxs, drs ...lb.	.14	.36	.14	.36	.14	.33

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

h Lowest price is for pulp; highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case;

Current Prices

Gums
Salt Cake

		Current Market		1943 Low	1943 High	1942 Low	1942 High
Kauri, N Y (A)							
Brown XXX, bgs	lb.	...	.77	...	.77	.60	.77
B3	lb.	...	.22	...	.27½	.18½	.27½
Pale XXX	lb.	...	.65¼	...	.65¼	.61	.66
No 3	lb.	...	.30	...	.30	.17¾	.22
Sandarac, cs	lb.	...	.97½	...	.97½	.95	1.10
Tragacanth, No. 1, cases	lb.	4.00	4.25	4.00	4.25	3.50	4.00
No. 3	lb.	1.10	1.20	1.10	1.20	1.10	1.20
Yacca, bgs (*PC*)	lb.	.06	.07¼	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys	lb.	.15½	.18½	.15½	.18½	.16	.18½
Iodine, Resublimed, jars	lb.	2.00	2.10	2.00	2.10	...	2.00
Lead Acetate, cryst. bbls	lb.	...	.12½	...	.12½	.12	.13¼
Arsenate, bg, c-l	lb.	.11½	.12	.11½	.12	.11	.12
Nitrate, bbls	lb.	...	.12½	...	.12½	.11	.14
Red, dry, 95% Pb_3O_4, lcl	lb.	.09	.10¾	.09	.10¾	.09	.10¾
97% Pb_3O_4, bbls delv	lb.	.09¼	.11	.09¼	.11	.09¼	.09½
98% Pb_3O_4, bbls delv	lb.	.09½	.11¼	.09½	.11¼	.09½	.10½
White, bbls, lcl	lb.	.08¼	.08¾	.08¼	.08¾	...	.07½
Basic sulfate, bbls, lcl	lb.	.07¼	.08	.07¼	.08	.06½	.07½
Lime, Chem., wks, bulk	ton	6.25	13.00	6.25	13.00	7.00	13.00
Hydrated, f.o.b. wks	ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls	lb.	.08	.09¾	...	.08	.079	.08
Lithopone, ordi., (*PC*), bgs	lb.	.04¼	.04½	.04¼	.04½	...	.04¼
Magnesium Carb, tech, wks	lb.	.06¼	.09¾	.06¼	.09¾	...	.06¼
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, bbls	lb.	.14	nom.	.14	nom.	.13	.14
Dioxide, tech bgs, lcl	ton	...	74.75	...	74.75	...	74.75
Methanol, pure, nat, drs	gal *l*	.63	.76	.63	.76	.55½	.61½
Synth, drs cl	gal. *m*	.34½	.40½	.34½	.40½	.34½	.40½
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, 90 lb cyl	lb.	.31	.40	.31	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks	lb.	2.75	3.00	2.75	3.00	...	...
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls	lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs	lb.	...	.32	...	.32	...	.32
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.06	.07½
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.16	.15	.18
Orthonitrotoluene, wks	lb.	...	.09	...	.09	...	.09
Para aldehyde, 98%, wks	lb.	...	.12	...	.12	...	.12
Chlorophenol, drs	lb.	...	.32	...	.32	...	.32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11	.12
Formaldehyde, drs, wks (*FP*)	lb.	.23	.24	.23	.24	.23	.24
Nitroaniline, wks, kgs	lb.	...	.45	...	.45	...	.45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	...	.15
Penetaerythritol, tech, del	lb.	.33½	.35½	.33½	.35½	.33½	.35½
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks	lb.	...	.48	...	.48	...	.48

PETROLEUM SOLVENTS AND DILUENTS

		Current Market		1943 Low	1943 High	1942 Low	1942 High
Lacquer diluents, tks, East Coast	gal.	...	.11	...	.11	...	.11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	.10½	.11
Petroleum thinner, 43-47, East, tks, wks	gal.	.08¾	.09½	.08¾	.09½	.08¾	.09½
Rubber Solvents, stand grd, East, tks, wks	gal.	...	.11	...	.11	.10½	.11
Stoddard Solvents, East, tks, wks	gal.	...	.09½	...	.09½	...	.09½
Phenol, U.S.P., drs (A)	lb.	.10½	.11¼	.10½	.11¼	.12½	.13
Phthalic Anhydride, cl and lcl, wks (A)	lb.	.13	.14	.13	.14	.14½	.15½
Potash, Caustic, wks, sol	lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake	lb.	.07	.07½	.07	.07½	...	.07
Potassium Bichromate csks *(*FP*)	lb.	.09⅜	.10	.09⅜	.10	...	.09⅜
Bisulfate, 100 lb kgs	lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 83-85% calc	lb.	.05½	.05¾	.05½	.05¾	.06½	.06¾
liquid, tks	lb.	...	.0275	...	.0275	...	.0275
dms, wks	lb.	.03	.03⅛	.03	.03⅛	.03	.03⅛
Chlorate crys, kgs, wks (A)	lb.	.11	.13	.11	.13	nom.	.11
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, bgs, dom, blk unit Per Unit K_2O	ton	.53½	.56	.53½	.56	.56	.58
Permanganate, USP, wks (*FP*) dms	lb.	.20½	.21	.20½	.21	.19¾	.21
Sulfate, 90% basis, bgs	ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks (*PC*)	gal.	...	.03¾	...	.03¾	.02¾	.03¾
Pyridine, ref., drms	lb.	...	.45½	...	.45½	...	.46
R Salt, 250 lb bbls, wks	lb.	...	.55	...	.55	...	.55
Resorcinol, tech., drms, wks	lb.	.68	.75	.68	.75	.68	.74
Rochelle Salt, cryst	lb.	.43½	.47	.43½	.47	...	.43½
Salt Cake, dom. blk wks	ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Saltpetre, grn, bbls ...100 lb.	8.20	8.60	8.20	8.60	...	8.20
Shellac, Bone dry, bbls ..lb. r	.42½	.46	.42½	.46	.39	.42½
Silver Nitrate, vials ....oz.	...	.32¾	...	.32¾	.26¾	.32¾
Soda Ash, 58% dense, bgs, c-l, wks 100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl ...100 lb.	...	1.13	...	1.13	1.05	1.13
Caustic, 76% grnd drms ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms ..100 lb.	...	2.30	...	2.30	...	2.30
Liquid, sellers tks 100 lb.	...	1.95	...	1.95	...	2.00
Sodium Acetate, 60% tech, powd, flake, bbls, wks lb.	.05	.06	.05	.06	...	.05
Benzoate, USP dms ....lb.	.46	.52	.46	.50	.46	.50
Bicarb, bbl, wks .. 100 lb.	1.70	2.05	1.70	2.05	1.70	1.85
Bichromate, cks, wks (*FP*) lb.	...	.07¾	...	.07¾	...	.07¾
Bisulfite powd, bbls, wks ....100 lb.	3.00	3.60	3.00	3.60	3.00	3.10
35-40% bbls, wks ..100 lb.	1.40	1.65	1.35	1.80	1.35	1.80
Chlorate, bgs, wks (A) lb.	...	.06¾	...	.06¾	...	.06¾
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	...	.08
Hyposulfite, cryst, bgs, cl, wks ....100 lb.	...	2.25	...	2.25	...	2.45
Metasilicate, gran, bbl, cl, wks ....100 lb.	2.50	3.55	2.50	3.55	...	2.50
Nitrate, imp, bgs (A) ton	...	33.00	...	33.00	...	29.35
Nitrite, 96-98% dom, cl. lb.	...	.06¾		.06¾	...	.06¾
Phosphate, di- wks ..100 lb.	6.00	7.25	6.00	7.25	...	...
cryst, bgs, c-l ....100 lb.	2.55	2.70	2.55	2.70	2.55	2.70
Tri-bgs, cryst, wks 100 lb.	2.70	3.45	2.70	3.40	2.70	2.85
Prussiate, yel, bbls, wks lb.	.10	.11	.10	.11	...	.11
Pyrophosphate, bgs wks c-l lb.	.0528	.0610	.053	.061	.053	.06
Silicate, 52°, drs. wks 100 lb.	1.40	1.80	1.40	1.80	...	1.70
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	...
Silicofluoride, bbls NY ..lb.	.05	.05½	.05	.05½	.09	.15
Sulfate, Anhyd, bgs 100 lb.	1.70	1.90	1.70	1.90	1.70	1.90
Sulfide, c-l, bbls, wks ..lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, c-l, wks ..lb.	3.15	3.90	3.15	3.90	...	3.15
Sulfite, powd, bbls, wks lb.	.05¼	.06	.05¼	.06	...	.05¼
Starch, Corn, Pearl, bgs ....100 lb.	...	3.46	...	3.46	...	3.10
Potato, bgs, cl ....lb.	...	.0637	...	.0637	.061	.0637
Rice, bgs ....lb.	.09½	.10¼	.09½	.10¼	.09	.10
Sweet Potato, bgs ..100 lb.	no stocks		no stocks		no stocks	
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs ....100 lb.	.18	.30	.18	.30	...	...
Roll, bbls ...... 100 lb.	2.40	2.90	2.40	2.90	2.40	2.70
Sulfur Dioxide, liquid, cyl. lb.	.07	.08	.07	.08	.07	.09
tks, wks ....lb.	.04	.06	.04	.06	.04	.06
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	12.50	24.50
Ref'd, c-l, NY ......ton	13.00	21.00	13.00	21.00	17.25	19.25
Tin, crystals, bbls, wks ...lb.	no stocks		no stocks		no stocks	
Metal, (*PC*) (A) ......lb.	...	.52	...	.52	...	.52
Titanium Dioxide (*PC*) ..lb.	.15	.15¾	.15	.15¾	...	.14½
Toluol, drs, wks (*FP*) (A) gal.	...	.33	...	.33	...	.33
tks, frt all'd (*FP*) ....gal.	...	.28	...	.28	...	.28
Tributyl Phosphate, dms lcl, frt all'd ....lb.	...	.47	...	.47	...	.47
Trichlorethylene, dms, wks lb.	(*FP*)	.09	(*FP*)	.09	...	.08
Tricresyl phosphate (*FP*) lb.	.24	.54½	.24	.54½	.25	.31
Triethylene glycol, dms lcl lb.	...	.26	...	.26	...	.26
Triphenyl Phos, drs (*FP*) lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases ....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs .....lb.	.25	.26	.25	.26	.18	.20
Bees, bleached, cakes ...lb.	...	.60	...	.60	.58	.61
Candelilla, bgs ....lb.	.38	.48	.38	.48	.33	.38
Carnauba, No. 1, yellow, bgs. ....lb.	.83¼	.93¼	.83¼	.93¼	.83¼	.89
Xylol, frt all'd, tks, wks..gal.	...	.27	...	.27	...	.27
Zinc Chloride fused, wks..lb.	.05	.0535	.05	.0535	...	.05
Oxide, Amer, bgs, wks lb.	.07¼	.07½	.07¼	.07½	...	.07¼
Sulfate, crys, bgs, ..100 lb.	3.60	4.35	3.60	4.35	3.60	3.65

Oils and Fats

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Babassu, tks, futures ....lb.	...	.111	...	.111	no prices	
Castor, No. 3, bbls ......lb.	.13¾	.14¼	.13¾	.14¼	.12½	.13¾
China Wood, drs, spot NY lb.	...	.39	...	.39	.39	.40¾
Coconut, edible, drs NY ..lb.	...	.0985	...	.0985	...	...
Cod Newfoundland, dms..gal.	...	.90	...	.90	.85	.90
Corn, crude, tks, mills ...lb.	...	.12¾	...	.12¾	.12⅕	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1530	...	.1530	.117	.143
Menhaden, tks, Baltimore gal.	...	.089	...	.089	.63¾	.666
Light pressed, drs .....lb.	.1305	.1307	.1305	.1307	.11	.139
Oiticica, liquid, dms .....lb.	...	.25	...	.25	...	...
Oleo, No. 1, bbls, NY ...lb.	.13¾	nom.	nom.	.13¾	...	.13¾
Palm, Niger kernel, cks bulk ....lb.	...	.0825	...	.0825	.0925	...
Peanut, crude, tks, f.o.b.mill lb.	...	.13	...	.13	.12⅞	.13
Perilla, crude dms, NY (A) lb.	...	.245	...	.245	...	.246
Rapeseed, denat, bulk .....lb.	...	.1150	...	.1150	...	...
Red, dms ....lb.	.13¼	.14¼	.13¼	.14¼	.11¾	.143
Soy Bean, crude, tks, mill lb.	...	.1175	...	.1175	.12¼	nom.
Tallow, acidless, bbls .....lb.	...	.14¾	...	.14¾	...	
Turkey Red, single, drs ..lb.	.10	.14½	.10	.14½	...	.08¾

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b N. Y., refined 6c higher in each case.

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DAY Water Cooled 3-Roll Mill, 12″ x32″.
ROSS Water Cooled 3-Roll Mill, 16″ x40″.
JOHNSON 4 Eye Washing Type, 18″ plate and frame Filter Press, C.I.
SHRIVER 12″ Lead Filter Press, closed delivery.
OLIVER CONTINUOUS FILTERS, 4′x5′.
DeLAVAL No. 54-51 Clarifier, M.D.
SHARPLES Super Centrifuge, Stainless Steel Bowl.
ABBE Silex Lined 300 gallon Pebble Mill.
ABBE Jacketed Porcelain Lined Pebble Mill, 270 gal.
Jar and Pebble Mills, 1 to 35 gal. capacity.
STAINLESS STEEL Tanks, New, 750 and 1000 gal.
Glass Lined Closed Jacketed Kettle, 600 gal.
PATTERSON 500 gal. Closed Jacketed Kettle, with Agitator.
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FOR SALE

1—Frederking Still, 5′3″ I.D. x 10′9″ Overall
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80—Wood Storage and Fermenting Tanks, 130-8600 gals.
6—Pneumatic Scale Straight Line Labelers
9—Semi-Automatic Labelers—World and Ermold
1—Worrell's Dryer No. 3, 3′ dia. x 18′ long complete with carrier wheels
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1—Buflovak 5′ x 10′ Rotary Vacuum Dryer
1—Buflovak 24″ x 20″ Vacuum Drum Dryer
1—Buflovak 32″ x 90″ Atmospheric Double Drum Dryer
1—No. 5 Sweetland Filter
4—Tolhurst 40″ Bottom Discharge Centrifugals, motor driven
2—Buffalo 6′ Atmospheric Crystallizer
1—Jeffrey 24″ x 12″ Hammer Mill, m.d.
15—Pebble Mills, Lab. to 600 gals.
10—Filter Presses, 12″ x 12″ to 36″ x 36″
6—Tolhurst 32″, 40″, 48″, 60″ Centrifugals
10—Steel, Lead Lined Kettles, 1,000 to 1,700 gals.
3—Sharples No. 6 Centrifuges
3—Oliver Rotary Filters, 5′ x 6′, 6′ x 6′, 5′ x 8′

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1—36-Ton Fairbanks Tank Scale
20-Ton Browning Loco Crane

STORAGE TANKS
14— 10,000, 15,000, 20,000 and 26,000-gal. Cap. Horizontal and Vertical
100,000-gal. Cap. Tank on 80-ft. Tower
50,000-gal. Cap. Tank on 100-ft. Tower
35,000-gal. Tank on 75-ft. Tower
5—Underwriter's Fire Pumps, 750 and 1,000 G.P.M.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

Between the Lines

(Continued from page 440)

prices, the price generally has remained very stable over a period of years.

Referring again to stocks found abroad, without counting these, it has already been ascertained that as much citric acid will be available this year, as in 1942. No increase is anticipated, because the war has increased the demand, and there is a molasses shortage, at least in this country, from which citric acid is derived. The molasses supply may clear up later, but at present that part of it intended to be bought from Cuba is still in doubt, due to price disagreements.

There are over-stocks available in all West Indies sources however, and it is still assumed here that the improved shipping outlook, plus other factors, will mean that the projected delivery schedule for the coming year can be carried out.

Meanwhile, War Food Administration has suggested the possibility of obtaining substitute acids, as well as limited supplies of lemon oil. In this respect, if the stocks found in Sicily are at all what has been indicated, the direct allocations for Lend-Lease may reflect on the domestic supply in easing the pressure from that quarter, at least.

Industry users are submitting reports intended to guide officials in Washington in determining supply requirements. Where possible, it is intended to attempt the use of materials in more ample stocks for those in short supply, it is indicated.

Reviewing the fats and oils position generally, it will be remembered that production of the four principal oil crops in this country was set at 45.5 million acres for this year, compared with 42.5 million acres in 1942. The flaxseed crop exceeded the acreage set by 700,000, making the largest domestic flaxseed crop in its history, but both soybean and peanut crops fell short of projected goals, while exceeding by wide margins, the 1942 production. There is in prospect for 1943-44 a 10 percent gain in overall vegetable oil production however. A further expansion of oilseed acreage is expected for 1944.

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Index to Advertisers

"WE"-EDITORIALLY SPEAKING

We recently ran across an interesting survey made by Gustavus J. Esselen, Inc., Consulting Chemists and Chemical Engineers, in their house organ, *The Research Viewpoint.*

In this survey the readers of that publication were invited to ballot on what six budding industries will, in the next decade, contribute most to the progress, employment and general welfare of America. Answers came from a broad group including top executives, professors, writers, scientists and college undergraduates. Out of thirty-nine industries listed the ten most frequently chosen were:

Aviation	90%
Radio and Electronics	90%
Plastics	87%
Housing	50%
Alloys and Metallurgy	43%
Food Processing	43%
Synthetic Rubber	36%
Chemical Engineering	36%
Synthetic Drugs	30%
Automotive	28%

We agree with a comment of the conductors of the survey that possibly the term Chemical Engineering was too vague; that this is more a profession than an industry. The vote might have been higher if the term Chemical Industry had been used. However, as five or six of the industries mentioned might well be classified as chemical industries, it seems that in the judgment of a considerable group of intelligent persons, representing many walks of life, we may expect our industry to play a most important role in future progress.

It seems that nothing is sacred from government regulations these days. For instance, take this recent announcement from the War Production Board, "Baby pants and crib sheetings made from fabrics coated with vinyl resins probably cannot be made in larger quantities for a few months, because the supply of resins at present is inadequate for all needs. But by December, 1943, there should be adequate supplies for essential civilian requirements".

How they will determine cases of essentiality for baby pants we, of course, wouldn't know.

We always try to have our trusty camera with us so as not to miss a good picture, but we must admit we slipped up on one last month. As newly elected members of the New York professional chapter of Alpha Chi Sigma, national chemical fraternity, Drs. Per K. Frolich, Marston T. Bogert, C. R. Downs and Robert J. Moore were required, as is the usual custom, to attend the next nearby student chapter initiation, which happened to be at New Haven this time, and go through the routine with the student initiates. Unbeknownst to the initiates, however, part of the ceremony consisted of riding the Yale goats. Our heroes were a bit taken aback but saw the thing through with determination. The others found some difficulty in keeping up with their younger colleague, Dr. Bogert, who headed the procession on the Judas goat, but all came through without a scratch.

Toluene probably will not get much easier for the duration because it is just about the ideal aviation fuel.

In spite of the emphasis placed on fire protection in industry the losses resulting from fire each year are startling when reviewed. In a recent statement H. L. Miner of the du Pont Company cited the following disastrous losses during the present war. Fire caused the destruction of one-tenth of the crude rubber supply in the U. S. A., one entire year's supply of cork; enough grain to provide bread rations to an army of 700,000 men for twelve months; and 250,000 pounds of powdered eggs destined for overseas shipment. To these could be added many others totaling many millions of dollars. While chemical research is making progress in the development of fire retardant products and processes, no effort should be spared to keep industry and the public informed on how to take advantage of the knowledge and products already available.

A recent contribution to the *Catalyst* by Floyd Parsons expresses some of the admiration we have always felt for the processes of the human body.

"EFFICIENCY

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"Where can you find a ventilating plant as wonderful as the nose, lungs, and skin? Did you ever see an electrical switchboard to compare with the spinal cord?

"Isn't such a marvelous mechanism worthy of the highest respect and the best care?"

Fifteen Years Ago

From Our Files of October, 1928

The American chemical industry is now third in capitalization among American industries, third in number of employees, first in consumption of coal, and second in consumption of electrical energy. The total value of the output of chemicals has increased from $1,046,994,000 in 1914 to roughly $3,000,000,000 in 1928, the latter figure representing more than half the total value of the world output. Of the production, about six percent ($200,000,000) is exported, so that 94 percent of the industry is kept occupied in supplying the home market.

National Ammonia Co., subsidiary of E. I. duPont de Nemours, acquires Pacific Ammonia & Chemical Co., largest manufacturer of anhydrous ammonia on West Coast. The merged business will be conducted under the name of National Ammonia Co., Inc.

Dr. Herbert Dow is announced as the recipient of the Perkin medal for 1930.

Robert Collyer Ingalls, president, Doe & Ingalls, Inc., dies unexpectedly at his home in Lynn, Mass., September 11.

Thomas J. Dee, vice-president and secretary, Davison Chemical Co., dies unexpectedly while on visit to New York, August 29.

James A. Rafferty, vice-president, Carbide & Carbon Chemicals Corp., since 1924, is elected president of the company.

Wishnick-Tumpeer, Inc., develops the manufacture of carbon black through the Wheatley Press process.

Formation of Ansbacher-Siegle Corp., is approved by stockholders of G. Siegle Corp. and Ansbacher Corp.

Leland I. Doan is appointed sales manager of the Dow Chemical Co.

Efforts of the I. G. Farbenindustrie of Germany to establish a market for its products in Czechoslovakia by transfer of part of its production to that country and by price concessions have aroused opposition directed toward protecting and preserving the Czechoslovak chemical industry.

Part 2. Patents and Trademarks

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

From Official Gazette—Vol. 553, Nos. 1, 2, 3, 4—p. 444

Agricultural Chemicals

Insecticidal and fungicidal preparation. No. 2,325,720. Ewald Urbschat and Franz Heckmanns to Winthrop Chemical Co. Inc.
Combating sucking, soft-bodied and scale insects and their eggs which include applying thereto a toxic quantity of diallyl maleate. No. 2,325,790. William Moore and Richard Roblin to American Cyanamid Co.
Diamyl maleate as an insecticide. No. 2,325,791. William Moore and Richard Roblin to American Cyanamid Co.
Solution of an insecticidal rotenone product in a solid, pulverizable and fusible phenol-aldehyde condensation product. No. 2,326,297. Mortimer Harvey to The Harvel Corp.
Insecticide. No. 2,326,350. Samuel Gertler and Herbert Haller to Claude Wickard, Secretary of Agriculture of the U.S.A.
Plant regulant composition containing as an essential active ingredient a monocarboxylic acid having a non-carboxyl hydrogen replaced by an aromatic ring having a nuclear halogen substituent. No. 2,326,471. John Lontz to E. I. du Pont de Nemours & Co.
Fluorine arsenates of zinc as insecticides and fungicides. No. 2,326,-472. Sven Lundback and Bertil Nilsson to Bolidens Gruvaktiebolag.
Pest control using self-dispersible composition comprising a substantially anhydrous liquid vehicle containing in clear solution rotenone, tetraethylthiuram monosulfide and an amine salt of a higher alcohol sulfate. No. 2,327,105. Hubert Guy to E. I. du Pont de Nemours & Co.
Mothicide and ambrosiacide which comprises an alkoxypolychlorobenzene. No. 2,327,338. Thomas Carswell to Monsanto Chemical Co.
Fungicide which comprises a stable mixture of chloroform liniment extract of Cicuta plant and a chloroform liniment extract of copper sulfate. No. 2,327,812. Sisto Marisco.

Cellulose

Laminated wood product. No. 2,325,669. Camille Dreyfus.
Cellulose fibrous materials. Method of improving properties thereof. No. 2,327,760. Herbert Bestian and Max Schurmann.
Far-hydrolyzed cellulose esters. Method of preparing. No. 2,327,770. Carlton Crane to Eastman Kodak Co.
Cellulose derivative and process of making same. No. 2,327,911. Leon Lilienfeld, deceased. Antonie Lilienfeld, administratrix to Lilienfeld Patents, Inc.

Ceramics

Glass article and method of making it. No. 2,326,012. Robert Dalton to Corning Glass Works.
Glass which consists of 89%–95% of silica and over 5% but not over 11% of titanium oxide and which has a coefficient of expansion less than that of silica. No. 2,326,059. Martin Nordberg to Corning Glass Works.
Enameling composition and the like and method of making the same. No. 2,326,348. Leon Frost and Charles Commons, Jr., to The Titanium Alloy Manufacturing Co.
Pottery ware comprising a base formed of ceramic material containing pyrophyllite. No. 2,327,076. Johann Stangl to Fulper Pottery Co.
Process of silver coating glass to form a mirror. No. 2,327,723. Andrew Levaggi.
Process treating a glass surface, which comprises applying a film of adhesive to the glass surface and subjecting the treated surface to temperatures reduced sufficiently to cause chipping off of adhesive and glass therefrom. No. 2,327,868. Walter Campbell to Pittsburgh Plate Glass Co.
High strength ceramic surface. No. 2,327,972. Kenneth Stettinius and Benjamin Dewey to Lapp Insulator Co.

Chemical Specialties

Lubricating composition containing a metal salt of an acid of phosphorus having a halogenated organic substituent. No. 2,325,597. Bruce Farrington, James Clayton and John Rutherford to Standard Oil Co. of California.
Plastic, non-shrinking, non-hygroscopic calking compound. No. 2,325,-726. Harold Acker to W. P. Fuller & Co.
Waterproofing solid fuel briquettes having a starch binder. No. 2,325,840. John Erickson.
Oil-resistant synthetic rubber cement and method of preparing same. No. 2,325,984. Donald Sarbach to The B. F. Goodrich Co.
Bearing material consisting of synthetic resin moulding powder of phenol-formaldehyde and fibrous asbestos together, lead, antimony, and flake graphite. No. 2,326,000. Charles Teeple to Crane Packing Co.
Hydrocarbon oil composition comprising a refined hydrocarbon oil, an ester of phosphorous acid and a relatively high boiling aliphatic alcohol. No. 2,326,140. Felix Gzemski to The Atlantic Refining Co.
Fireproofing composition containing zinc carbonate in finely divided form and a chlorinated resinous material which will liberate hydrogen chloride. No. 2,326,233. Martin Leatherman.
Halogenated extreme pressure lubricant. No. 2,326,315. Norman Williams to The Pure Oil Co.
Method of multicolor printing and ink therefor. No. 2,326,321. Floyd Barmeier to General Printing Ink Corp.
Oil for use in dielectric structures comprising mineral oil, aromatic hydrocarbon material capable of accepting added hydrogen, and catalyst material capable of promoting hydrogenation. No. 2,326,-324. Henry Berger, Lyle Hamilton and Everett Fuller to Socony-Vacuum Oil Co. Inc.
Drawing composition base comprising sulfonated talloil in major proportion and plasticizing amounts of sulfonated sperm oil. No. 2,326,-387. Edward Nill to The H. A. Montgomery Co.
Stabilized mineral oil composition. No. 2,326,483. Robert Moran to Socony-Vacuum Oil Co. Inc.
Improved mineral oil composition comprising a mineral oil having admixed therewith an oil miscible condensation product. No. 2,326,496. Orland Reiff to Socony-Vacuum Oil Co. Inc.
Depilatory comprising polymerized rosin and an oily modifier therefor. No. 2,326,609. Joseph Borglin to Hercules Powder Co.
Polymerized insulating compound. No. 2,326,748. Arthur Brown and William Atkinson to Westinghouse Electric & Manufacturing Co.
Polymerized insulating compound for use as electrical insulation, comprising a polymerized oil selected from the group of tung oil and oiticica oil, and a polymerizing catalyst solution for the oil. No. 2,326,749. Arthur Brown and William Atkinson to Westinghouse Electric & Manufacturing Co.
Dry cleaning composition. No. 2,326,772. Lawrence Flett to Allied Chemical & Dye Corp.
Acidic cleaning composition that is stable in solid form, and adapted in aqueous solution to remove scale, oxide impurities, grease and oil from ferrous and non-ferrous metal surfaces, while inhibiting acid attack upon surfaces of aluminum, brass, copper, tin and lead. No. 2,326,837. Timothy Coleman to National Carbon Co. Inc.
Precipitable sizing material comprising a mixture of substantial quantities each of starch, rosin and an alkali silicate from the group consisting of metasilicate and sesquisilicate. No. 2,326,849. George Fowler and Donald Pattilloch to Chemical Development, Inc.
Stabilized mineral oil composition. No. 2,326,938. Everett Fuller and Lyle Hamilton to Socony-Vacuum Oil Co. Inc.
Seam sealing compound. No. 2,326,966. Lawrence O'Leary to W. P. Fuller & Co.
Mineral oil emulsion comprising mineral spray oil, oil-soluble air-blown rapeseed oil, sodium lauryl sulfate, and less than about one per cent of ammonium hydroxide sufficient to assist spreading of the oil. No. 2,327,152. Marcellus Flaxman to Union Oil Co. of California.
New water-repellent agent 3-octadecyl-2:5-diketo-oxazolidine. No. 2,327,162. Alfred Baldwin and Maurice Rogers, to Imperial Chemical Industries Limited.
Parting material for preventing the adhesion of molding sand to a pattern or core box comprising mainly finely divided sulfur. No. 2,327,173. Richard Carson and Reuben Saeks to Carson-Saeks, Inc.
Dry cleaning composition comprising an emulsion of water in a volatile organic dry cleaning solvent. No. 2,327,182. Lawrence Flett to Allied Chemical & Dye Corp.
Dry-cleaning composition. No. 2,327,183. Lawrence Flett to Allied Chemical & Dye Corp.
Flexible, elastic, extensible tape capable of being heat-treated to a tough, hard, and abrasion-resistant state, and consisting of a polyvinyl acetal resin and a plasticizer. No. 2,327,212. Winton Patnode to General Electric Co.
Abrasive article comprising abrasive grains and a binder comprising a polymer including an ester of an acrylic acid. No. 2,327,218. Norman Robie to The Carborundum Co.
Detergent soap normally forming a precipitate in hard water having incorporated therein a precipitate- inhibiting amount of the sodium salt of alphachloropolyacrylic acid as a water-softening agent. No. 2,327,302. Harry Dittmar to E. I. du Pont de Nemours & Co.
Dielectric for electrostatic condensers consisting substantially of a solid mixture of hydrogenated castor oil and from 5% to 50% of unhydrogenated vegetable oil. No. 2,327,372. Samuel Ruben.
Improved quenching oil composition comprising a mineral quenching oil and at least about 0.5 per cent by weight of a petroleum oil propane refining residue. No. 2,327,383. Clifford zur Horst, Blaine Wescott and Leslie Vollmer to Gulf Research & Development Co.
Liquid sealing compound. No. 2,327,450. Arthur Parker.
Drilling fluid addition for reducing the filtration of water from a salt water drilling fluid into porous formations traversed by a drill hole. No. 2,327,501. Thomas Chapman to Standard Oil Development Co.
Depilatory composition comprising a minor portion of "Rosin residue." No. 2,327,507. Clarence Cox.
Lubricating oil composition comprising a waxy hydrocarbon oil and a small amount of an auto-condensation product of a chlorine-containing paraffinic hydrocarbon substance. No. 2,327,535. Eugene Lieber and Harry Rice to Standard Oil Development Co.
Varnish base comprising a mixture of a heat bodied alkyl ether of cashew nut shell liquid and an oil selected from glyceride oils. No. 2,327,563. William Schaufelberger to The Harvel Corporation.
Non-offsetting printing ink having a high water tolerance. No. 2,327,-594. Donald Erickson and Paul Thoma.

Printing Ink. No. 2,327,595. Donald Erickson and Paul Thoma.
Printing Ink. No. 2,327,596. Donald Erickson and Paul Thoma.
Printing Ink. No. 2,527,597. Donald Erickson and Paul Thoma.
Improved vermifuge, a hydrochloric acid extract of the areca nut. No. 2,327,644. Arthur Howard.
Paint and varnish remover. No. 2,327,701. Carleton Ellis, Carleton Ellis, Jr., and Bertram Ellis and Bank of Montclear to Chadeloid Chemical Co.
Lubricating oil composition comprising a petroleum lubricating oil containing in solution an interpolymer having a molecular weight above 2000 formed by the copolymerization of ethylene and another olefine. No. 2,327,705. Per Frolich and Henry Kellog to Standard Oil Development Co.
Crayon comprising a mixture of substantially five parts by weight of carnauba wax and substantially one part by weight of triple pressed stearic acid, and having approximately ninety drops of olive oil per ounce of mixture incorporated therein. No. 2,327,854. Per Johan Berggren.
Light intercepting cosmetic composition. No. 2,327,899. Samuel Isermann and Ernst Ohlsson.
Fluxing composition. No. 2,327,958. Charles Carey to Dewey & Almy Chemical Co.
Improved quenching oil composition comprising a mineral quenching oil and a thickened vegetable oil in controlled amount. No. 2,327,-976. Clifford zu Horst, Blaine Wescott, and Leslie Vollmer to Gulf Research & Development Co.
Improved quenching oil composition comprising a mineral quenching oil and at least about 1.0 per cent by weight of an oil-soluble terpene polymer resin. No. 2,327,977. Clifford zu Horst, Blaine Wescott, and Leslie Vollmer to Gulf Research & Development Co.

Car Tar Chemicals

Refining high boiling carbonaceous materials for the production of marketable coke and high quality motor fuel. No. 2,326,704. Ernest Thiele, George Schmitkons, and Carl Hull to Standard Oil Co.
Continuous process for agglomerating dry, flocculent carbon black. No. 2,327,016. Samuel Carney to Phillips Petroleum Co.

Coatings

Coating composition containing substantial amounts of cyclized rubber obtained by reacting the rubber with amphoteric metal halides and a melamine-formaldehyde resin. No. 2,325,986. Robert Swain and Pierrepont Adams to American Cyanamid Co.
Coating composition containing substantial amounts of polystyrene and a melamine-formaldehyde resin. No. 2,325,987. Robert Swain and Pierrepont Adams to American Cyanamid Co.
Metal coating composition. No. 2,326,102. George Black.
Producing phosphate coatings on ferrous metal articles. No. 2,326,-309. Gerald Romig to American Chemical Paint Co.
Coating composition adapted to be applied by spraying. No. 2,326,-623. Edwin Crosby to E. I. du Pont de Nemours & Co.
Coating composition containing polyvinyl acetate methylal and a melamine-formaldehyde resin. No. 2,326,698. Robert Swain and Pierrepont Adams to American Cyanamid Co.
Coating composition containing polyisobutylene and a melamine-formaldehyde resin. No. 2,326,699. Robert Swain and Pierrepont Adams to American Cyanamid Co.
Composition of matter, capable of augmenting the frictional characteristics of a friction element. No. 2,327,785. Mortimer Harvey to The Harvel Corporation.

Dyes, Stains

Dyeing mixtures of fibrous materials prepared from synthetic polyamides of the linear type and of high-molecular weight and of amino group-containing fibrous materials with acid wool dyestuffs. No. 2,325,972. Josef Nusslein and Carl Muller to General Aniline & Film Corp.
Color composition comprising a vat dyestuff and an iron phthalocyanine compound. No. 2,327,405. Alfred Davidson, Ernest Chapman, Simon McQueen and Joseph Payman to Imperial Chemical Industries, Limited.
Coloration of cellulose acetate materials, by incorporating in the materials a 4-amino-4′-nitroazobenzene, diazotizing this amino-azo compound and coupling it with m-chloraniline. No. 2,327,426. Kenneth House and Henry Olpin to Celanese Corp. of America.

Equipment

Ferrous alloy thermocouple element. No. 2,325,759. Donald Finch to Leeds & Northrup Co.
Fractionating apparatus for liquids comprising a column and a plurality of baffled cells. No. 2,325,818. Alfred Wetikamp and Alex Oblad to Standard Oil Co.
Vapor and liquid contacting apparatus. No. 2,325,819. Alfred Weitkamp and Lawrence Brunstrum to Standard Oil Co.
Method and apparatus for producing mineral wool. No. 2,325,940. Harold Coss to Johns-Manville Corporation.
Heater for use in treating oil. No. 2,326,032. William Homfeldt.
Diaphragm for chlorine cells. No. 2,326,101. William Nichols to Westvaco Chlorine Products Corp.
Chlorinator for feeding a chlorine solution into a stream of water. No. 2,326,212. Joseph Garelick.
Heat insulating sheet having a high modulus of rupture and comprising asbestos fibers and a binder. No. 2,326,516. George Brown to Johns-Manville Corporation.
Apparatus for producing ozone. No. 2,326,601. John Arff to Rayozone Products Corp.
Electroplating apparatus. No. 2,326,624. Henry Csanyi, one-half to Harry Wanvig.
Radioactive unit in the form of a solid compact mass capable of emitting alpha beta and gamma rays. No. 2,326,631. Alois Fischer to United States Radium Corp.
Manufacturing an improved composition storage battery separator composed essentially of porous rubber. No. 2,326,690. Bruno Schubert to National Lead Co.
Mold for forming molten glass. No. 2,326,730. John Kelly and William Kelly.
Gas analyzer. No. 2,326,884. Clyde Phelps to Weaver Manufacturing Co.
Odormeter for estimating the concentration of odor in a gas. No. 2,327,060. Arthur Pollak and Thomas Willingham to West Virginia Pulp & Paper Co.
Filter disk having good handling qualities, comprising cellulosic wadding the surface fibers of which are bonded. No. 2,327,250. George Cruickshank to Johnson & Johnson.
Hydrocarbon catalytic cracking apparatus. No. 2,327,438. George Kuhn to Sinclair Refining Co.
Apparatus for treating hydrocarbon oils. No. 2,327,490. Aaron Bagsar to Sun Oil Co.
Apparatus for gas analysis. No. 2,327,539. Edward McAlister to Standard Oil Development Co.
Method and apparatus for measuring porosity of solids. No. 2,327,642. William Horner to Core Laboratories, Inc.
Grinding wheel comprising abrasive grains, acid insoluble organic bond holding the abrasive grains together, and a filler of polyvinyl chloride. No. 2,327,846. Samuel Kistler to Norton Co.

Explosives

Initiator charge for detonating purposes including a heavy metal salt of nitroaminoguanidine. No. 2,325,742. Leroy Clark to American Cyanamid & Chemical Corp.
Use of lead salts of nitroamino guanidine as initiating charge in firing devices. No. 2,326,008. Le Roy Clark to American Cyanamid & Chemical Corp.
Process of manufacturing ammunition. No. 2,327,867. Gordon Calhoun to Remington Arms Co., Inc.
Ammunition manufacture. No. 2,327,885. Robert Grace and Isaac Walker to Remington Arms Co., Inc.

Food Chemicals

Making cheese including the steps of adding an alkaline agent. No. 2,326,132. Ernest Fear, 30% to Irving Fear and 20% to Helendoris Murphy.
Method of making cheese. No. 2,326,133. Ernest Fear, 30% to Irving Fear and 20% to Helendoris Murphy.
Bread improver comprising carbamide and urease in a substantially dry form. No. 2,326,278. John Baker to Standard Brands, Inc.
Preparing bauxite adapted for the refining of sugar solution without lowering the pH of said solution. No. 2,326,369. William LaLande, Jr., to Porocel Corporation.
Treating whole grapes normally subject to disintegration in boiling liquids comprising subjecting the whole grape to the hydrolyzing action of a sodium hydroxide solution. No. 2,326,407. Otto Steinwand to S & W Fine Foods, Inc.
Dehusking carob beans. No. 2,326,868. Louis Lantz and Wadim Roman to The Calico Printers' Association Limited.
Double film sausage casing consisting of an inner film of polyamide and an outer film of regenerated cellulose. No. 2,326,899. Kurt Thinius.
Converting liquid corn sirup containing a substantial amount of dextrin and water to a dehydrated solid expanded corn sirup product. No. 2,327,351. Wilbert Heyman to Granular Foods, Inc.
Poultry feed containing from 0.5% to 12% of short wool fibers mixed with conventional feeding ingredients principally of vegetable origin. No. 2,327,698. Joseph Creely and John Levering to Eavenson & Levering Co.

Industrial Chemicals—Inorganic

Removing water in a continuous process by evaporation from an aqueous solution of a non-volatile material that is a solid at ordinary temperatures. No. 2,326,099. Vaman Kokatnur and Joseph Jacobs, Jr., to Autoxygen, Inc.
Making calcium sulfate in the anhydrite form. No. 2,326,157. Andrew McCord and Harold Saunders to The Sherwin-Williams Co.
Manufacturing fibrous insulation. No. 2,326,517. George Brown to Johns-Manville Corporation.
Preparing a synthetic silica gel containing an active metallic oxide other than silica. No. 2,326,523. Gerald Connolly and Rhea Watts to Standard Oil Development Co.
Removing lead sulfate from titanium salt solutions. No. 2,326,592. Charles Russell Wicker to E. I. du Pont de Nemours & Co.
Manufacture of catalysts for use in hydrocarbon conversion reactions. No. 2,326,706. Charles Thomas and Jacob Ahlberg to Universal Oil Products Co.
Increasing the strength of clay material. No. 2,326,729. John Whittemore and Charles Oberfell to The Mead Corporation.
Producing formed tetrasodium pyrophosphate compositions. No. 2,326,949. Raymond Kepfer to E. I. du Pont de Nemours & Co.
Separating superheated vapors of mutually soluble constituents and groups of mutually soluble constituents of different boiling points. No. 2,327,133. Paul Schuftan to The British Oxygen Co. Ltd.
Recovering and converting to water soluble form, water insoluble titanium values of residue resulting from (1) formation of a titanium sulfate solution containing titanium material which has remained undissolved by a previous sulfuric acid attack on said material, and (2) subsequent separation of the major part of the titanium sulfate solution. No. 2,327,166. L'Roche Bousquet and Maxwell Brooks to General Chemical Co.
Electrodeposition of insulating material. No. 2,327,462. Samuel Ruben.
Removing wax from floors. No. 2,327,495. Anton Budner.
Fractional distillation of a volatile mixture of relatively narrow boiling range involving the cooling of distillate vapors by indirect heat exchange with a cooling medium to the use of thus-produced condensate as reflux in the fractionating zone. No. 2,327,643. Glen Houghland to The M. W. Kellogg Co.
Sodium nitrite composition of enhanced resistance to caking. No. 2,327,767. Francis Chambers, Jr., to E. I. du Pont de Nemours & Co.

Distillation process and apparatus. No. 2,327,788. Kenneth Hickman to Distillation Products, Inc.

Industrial Chemicals—Organic

Polymeric guanidines and process for preparing the same. No. 2,325,586. Elmer Bolton and Donald Coffman and Lucius Gilman to E. I. du Pont de Nemours & Co.
Preparing pentaerythritol and dipentaerythritol. No. 2,325,589. Edward Bried to Hercules Powder Co.
Preparing cyclopropane. No. 2,325,591. Walter Christiansen and John Ort to E. R. Squibb & Sons.
Process for preparing cyclopropane. No. 2,325,628. John Ort to E. R. Squibb & Sons.
Composite material for use in the manufacture of vehicle bodies comprising layer of plastic material laminated in alternation with at least an equal number of layers of metal. No. 2,325,668. Camille Dreyfus.
Preparing 1,3-diaryl-4,7-dihydroisobenzofurans. No. 2,325,727. Roger Adams to E. I. du Pont de Nemours & Co.
Making dinitro cresol. No. 2,325,753. Maurice Dolt and Alfred Hill to American Cyanamid Co.
Preparing cyclic acetals of formaldehyde. No. 2,325,760. Wilhelm Fitzky to General Aniline & Film Corp.
Separation of lower polyhydric alcohols from polyhydric alcohol mixtures. No. 2,325,783. Eugene Lorand to Hercules Powder Co.
Manufacture of 3-nitro-4-amino anisol. No. 2,325,797. Roy Pizzarello to Interchemical Corporation.
Condensation products. No. 2,325,803. Karl Schmidt and Ottomar Wahl to General Aniline & Film Corp.
Electrical resolution of an oil continuous emulsion. No. 2,325,850. Gordon Hanson to Petrolite Corp. Ltd.
Reaction of thiourea with substantially pure 2,6-lutidine in aqueous solution. No. 2,325,880. George Reithof to Pittsburgh Coke & Iron Co.
Dehydrogenating hydrocarbons. No. 2,325,911. Hal Huffman to Union Oil Co. of California.
Manufacture of liquid hydrocarbons from gaseous and solid carbonaceous materials. No. 2,325,916. Cecilio Ocon and Ernest Ocon.
Polyvinyl halide composition. No. 2,325,951. Thomas Gresham to The B. F. Goodrich Co.
Softener for copolymers of butadiene and acrylonitrile. No. 2,325,980. Donald Sarbach to The B. F. Goodrich Co.
Process of polymerizing methacrylic acid. No. 2,326,078. Ernest Trommsdorff and Gerhard Abel to Rohm & Haas Co.
Brominated acrylonitrile and method of preparing the same. No. 2,326,095. James D'Ianni to Wingfoot Corporation.
Diguanidine diammonium ferrocyanide. No. 2,326,107. Urner Liddel to American Cyanamid Co.
Removing H_2S from hydrocarbon gases. No. 2,326,122. William Chalfant and Henry McConomy to The Atlantic Refining Co.
Protein recovery from oil-free cottonseed meal, after the separation from it of its water-soluble protein. No. 2,326,195. Lawrence Bass and Harold Olcott to Cotton Research Foundation.
Production of butadiene. No. 2,326,258. Otto Schmidt and Sigmund Stadelmann.
Alkali metal heptadecyl-9 sulfate preparation. No. 2,326,270. James Werntz to E. I. du Pont de Nemours & Co.
Copolymer, with a member of the class consisting of polymerizable vinyl and vinylidene compounds, of an organic isocyanate. No. 2,326,287. Donald Coffman to E. I. du Pont de Nemours & Co.
Decolorizing lubricating oil by contact with clay. No. 2,326,294. William Gee to The Texas Co.
Decolorizing oil with decolorizing earth in the presence of naphtha. No. 2,326,295. William Gee to The Texas Co.
Removing alkalinous metal ions from gels. No. 2,326,323. Wayne Benedict to Universal Oil Products Co.
Alpha (aliphatic oxy) acrylonitriles preparation. No. 2,326,373. John Long to Wingfoot Corp.
Flocculating reagent for use in the separation of suspended material from aqueous suspensions of organic material. No. 2,326,395. John Samuel to Unifloc Reagents Limited.
Treating fluid hydrocarbons. No. 2,326,438. Clement Clarke.
Treatment of conjugated diene hydrocarbons. No. 2,326,440. David Craig to The B. F. Goodrich Co.
Water-soluble nitrogen-containing heterocyclic compound. No. 2,326,497. Oskar Riester and Gustav Wilmanns to General Aniline & Film Corp.
Causing phosgene to react upon hydrogen halides of primary monoamines selected from the class consisting of alkyl, aralkyl, cycloalkyl and hydroaryl amines while continuously removing from the reaction mixture the hydrogen halides formed during the reaction. No. 2,326,501. Werner Siefken and Arnold Doser to General Aniline & Film Corp.
Producing a secondary alcohol of at least six carbon atoms per molecule from the corresponding olefine by treating said olefine with sulfuric acid. No. 2,326,505. Anton Tulleners to Shell Development Co.
Reaction product of substantially pure metacresolsulfonic acid and an aldehyde. No. 2,326,578. Urbain Thauau to Eli Lilly & Co.
Increasing the stability of isobutylene polymers having the property of thickening and improving the viscosity characteristics of hydrocarbon lubricating oils. No. 2,326,595. David Young and Charles Swoope to Jasco, Inc.
Emulsion of the oil-in-water type comprising free polymerized rosin, an alkali caseinate, and water. No. 2,326,610. Joseph Borglin to Hercules Powder Co.
Conversion of hydrocarbon oil into more valuable products. No. No. 2,326,627. Gustav Egloff and Vasili Komarewsky to Universal Oil Products Co.
Complex polyamino sulfur compound obtained by combining an aliphatic polyamine with at least two molecular proportions of

carbon disulfide in the presence of a base to form a polydithiocarbamate and reacting said polydithiocarbamate with a sulfur chloride. No. 2,326,543. William Hester to Rohm & Haas Co.

Treating the air in a confined space to freshen it that comprises the step of causing a solution of chlorophyll to be diffused. No. 2,326,672. Guy Paschal to himself and John Adams jointly.

Ethers. No. 2,326,702. Fred Taylor and Clarence Moyle to The Dow Chemical Co.

Cyanoethyl ether of tertiary amino alcohols. No. 2,326,721. Herman Bruson to The Resinous Products & Chemical Co.

4,4,6-trimethyl-2-thio-tetrahydro-1,3,2-oxazine. No. 2,326,732. Harry Fisher to U S. Industrial Alcohol Co.

Desalting and demulsifying an oil. No. 2,326,882. William Perdew to Globe Oil & Refining Co.

Increasing the solubility of halogenated phenols in soap solutions. No. 2,326,933. Gunther Endres.

Producing cholesterol conversion products containing sulfur.. No. 2,326,936. Herbert Fiedler, Karl Heimig, and Helmut Liesegang.

Preparing thiuram sulfides in a form resistant to dusting or flying. No. 2,326,984. Andrew Tomlin to Monsanto Chemical Co.

Production of fumaric acid from fermentable carbohydrates. No. 2,326,986. Selman Waksman, one-half to Merck & Co., and one-half to Chas. Pfizer & Co. Inc.

Preserving a specimen at a temperature between about 32° and 50° F. for an indefinite period which comprises introducing said specimen into heat exchange relationship with a eutectic mixture of an amine selected from the group consisting of monoethanolamine and ethylene diamine and a compound capable of depressing the melting point of the amine to the temperature at which it is desired to maintain said specimen. No. 2,327,041. Lyle Hill and Leland Short to The American Dairy Cattle Club.

Production of monocyclopentyl ether of a polyhydric alcohol. No. 2,327,053. Kenneth Marple, Edward Shokal and Theodore Evans to Shell Development Co.

Producing organic carbonyl compounds which comprises reacting with carbon monoxide and hydrogen an organic substance selected from the group which consists of the aliphatic and cyclic olefins. No. 2,327,066. Otto Roelen.

Polymerization of conjugated dienes. No. 2,327,080. Joseph Walker to E. I. du Pont de Nemours & Co.

Subjecting styrene to the polymerizing action of an alkali metal in the presence of an ether. No. 2,327,082. Joseph Walker to E. I. du Pont de Nemours & Co.

Preparing linear polyamides which comprises heating at reaction temperature bifunctional reacting material. No. 2,327,116. Donald Loder to E. I. du Pont de Nemours & Co.

Making omega-aminocarboxylic acids. No. 2,327,119. Elmore Martin to E. I. du Pont de Nemours & Co.

Production of pastes from polymerized vinyl chloride. No. 2,327,128. Archibald Renfrew and James Davison to Imperial Chemical Industries Limited.

Polyamide comprising the reaction product of a bifunctional diamine with a bifunctional compound. No. 2,327,131. Paul Salzberg to E. I. du Pont de Nemours & Co.

Separating a mixture comprising carbon dioxide, ethane and ethylene. No. 2,327,134. Paul Schuftan to The British Oxygen Co. Ltd.

Oxidizing scale wax. No. 2,327,155. Ralph Pollock to Union Oil Co. of California.

Effecting substitution halogenation of an olefinic hydrocarbon. No. 2,327,174. Oliver Cass to E. I. du Pont de Nemours & Co.

Extracting gelatinous material from gelatinous material stock. No. 2,327,185. Donald Grettie to Industrial Patents Corp.

Production of fumaric acid. No. 2,327,191. Jasper Kane, Alexander Finlay, and Philip Amann one-half to Chas. Pfizer & Co. Inc., and one-half to Merck & Co. Inc.

Water-soluble chemical compound being the reaction product of thiourea and a bischloromethyl compound. No. 2,327,213. Josef Pikl to E. I. du Pont de Nemours & Co.

Producing relatively non-photosensitive asphalt from relatively photosensitive asphalt. No. 2,327,247. Donald Carr and Harold Ritchey to Union Oil Co. of California.

Separating alkyl phenols. No. 2,327,312. Daniel Luten, Jr. and Aldo De Benedictis to Shell Development Co.

Drying crystalline urea. No. 2,327,333. Edward Kirkpatrick to E. I. du Pont de Nemours & Co.

Making an aliphatic monocarboxylic acid ester of an hydroxyalkyl cellulose. No. 2,327,397. Aubrey Broderick to Carbide and Carbon Chemicals Corp.

Swelling a cellulose organic derivative structure with a nitroparaffin, containing not more than six carbon atoms, and stretching the swollen structure. No. 2,327,413. Theron Finzel to E. I. du Pont de Nemours & Co.

Composition of matter selected from polymerized vinyl chloride, polymerized vinyl acetate and copolymers of vinyl chloride and vinyl acetate and a normally liquid organic condensation product selected from organic condensation reaction products of formaldehyde and turpentine, formaldehyde and pinene, formaldehyde and terpineol and formaldehyde and pine oil. No. 2,327,422. Mortimer Harvey to Harvel Research Corporation.

Purifying soap stock containing excess alkali from the alkali refining of glyceride oils and making soap therefrom. No. 2,327,502. Benjamin Clayton to Refining, Inc.

Refining glyceride oils. No. 2,327,569. Benjamin Thurman to Refining, Inc.

Making metaldehyde. No. 2,327,570. Willard Vogel, fifty per cent to Paul Prutzman.

Plastic puttylike asphalt composition and process of making same. No. 2,327,752. Jacob van den Berge to Shell Development Co.

Aminotriazine-aldehyde-halogenated acetone condensation product. No. 2,327,771. Gaetano D'Alelio to General Electric Co.

Plasticized aminoplast. No. 2,327,772. Gaetano D'Alelio to General Electric Co.

Aminophenols and the preparation thereof. No. 2,327,773. Joseph Dickey and Arzy Gray to Eastman Kodak Co.

Separation of mixtures containing solvents. No. 2,327,779. Webster Fisher and Will Shearon, Jr., to Eastman Kodak Co.

Aluminum salt of hydroxy carboxylic acids. No. 2,327,815. Joseph Niedercorn and William Dawson to American Cyanamid Co.

Fuel for gas generating and dispensing systems. No. 2,327,835. Loyd White to Southern Steel Co.

Production of valuable hydrocarbons. No. 2,327,842. Newcomb Chaney to The United Gas Improvement Co.

Preparation of 2,3 dichloridioxane. No. 2,327,855. William Bitler and Leonard Nicholl to Kay-Fries Chemicals, Inc.

Phonograph record having a record surface comprising polymerized rosin and shellac in such proportions that the ratio of polymerized rosin to shellac is not less than about 1 to 4 and not over about 3 to 1. No. 2,327,862. Joseph Borglin to Hercules Powder Co.

Bituminous base dispersion for use in the production of colored bitumen dispersions. No. 2,327,882. Leonard Gabriel and John Rawlinson.

Substituted phenoxyalkyl ethers. No. 2,327,890. Henry Henze to Parke, Davis & Co.

Production of phenols and olefins. No. 2,327,938. Donald Stevens and Joseph McKinley to Gulf Research & Development Co.

Process of drying cornstarch and similar materials. No. 2,327,943. Louis Tiers to Proctor & Schwartz, Inc.

4-nitro-3,5-heptanediol. No. 2,327,961. Edward Degering and Austin Sprang to Purdue Research Foundation.

Process for controlling the reaction in the production of nitro-alkanes. No. 2,327,964. Edward Hodge to Commercial Solvents Corp.

Keto sulfides and process for making same. No. 2,327,966. Glen Morey to Commercial Solvents Corp.

Porous xerogel. No. 2,327,968. Kurt Kipper to American Cyanamid Co.

Vulcanizable polymerization product and a process of producing same. No. 2,327,975. Ewald Zaucker.

Leather

Bating composition which comprises calcium sulfide, a neutralizing agent and a proteolytic enzymatic preparation absorbed on wood flour. No. 2,326,306. Julius Pfannmuller and Hans Schleich to Wallerstein Co. Inc.

Treating salted or dried skins, hides and pelts for preliminary softening by subjecting the skins, to the action of an aqueous bath containing hydrogen sulfide. No. 2,326,798. Julius Pfannmuller to Wallerstein Co. Inc.

Manufacture of substitute leather. No. 2,327,540. Raymond McQuiston to Tanide Products, Inc.

Medicinals

Condensing 2-methyl-1,4-napthohydroquinone with acetyl-phytol in presence of an acid condensing agent. No. 2,325,681. Otto Isler to Hoffmann-La Roche, Inc.

Intermediates for estrogenic therapeutic agents. No. 2,326,068. Ewald Rohrmann to Eli Lilly & Co.

Production of riboflavin by butyl-alcohol producing bacteria. No. 2,326,425. Cornelius Arzberger to Commercial Solvents Corp.

Extracting a vitamin from a fish oil stearin to obtain a vitamin product of improved taste, odor and color. No. 2,326,644. Kenneth Hickman to Distillation Products, Inc.

Manufacture of glucosidelike derivatives of diol compounds of the steroid series. No. 2,326,653. Hans Inhoffen, Max Gehrke, and Walter Schoeller to Schering Corporation.

Manufacture of ketones of the cyclopentanopolyhydrophenanthrene series. No. 2,326,756. Adolf Butenandt, Hans Inhoffen, and Hans Dannenbaum to Schering Corporation.

Preparing a chorionic substance adapted to luteinize and cause growth of follicles and substantially free from anaphylactic action. No. 2,327,375. Erwin Schwenk and Gerhard Fleischer to Schering Corporation.

Producing unsaturated diols of the estrane series. No. 2,327,376. Erwin Schwenk to Schering Corp.

Medicinal composition for internal administration consisting of a volatile liquid anthelmintic. No. 2,327,564. Robert Scherer.

Preparation of vitamin E in concentrated form. No. 2,327,766. John Cawley to Distillation Products, Inc.

Metals, Alloys

Composite metal stock comprising a layer of high conductivity copper fusion bonded to a layer of chromium ferrite. No. 2,325,659. Thomas Chace to Clad Metals Industries, Inc.

Electrodeposition of manganese and cathode therefor. No. 2,325,660. Harold Chamberlain to Electro Manganese Corporation.

Cyclical process for the purification of catholyte in the electrowinning of manganese. No. 2,325,723. Elmer Wanamaker and William

Morgan to Electro Manganese Corp.

Cleaning the surface of a metallic article. No. 2,325,957. Christopher Krogel to Western Electric Co. Inc.

Simulated hammered metal finish. No. 2,326,001. Guido Ariotti and Edmond Bucy to Atlas Powder Co.

Preparing a metal catalyst which comprises treating an alloy which consists essentially of nickel with metal of the group consisting of alkaline earth metals and magnesium, with dilute acetic acid. No. 2,326,275. Joseph Zeltner.

Resistance material consisting of intimately mixed, collectively heat treated oxides of manganese, cobalt, nickel and copper. No. 2,326,-580. Charles Trenkle to Bell Telephone Laboratories, Inc.

Concentrating kyanite from its ores. No. 2,326,807. Francis Tartaron to Minerals Separation North American Corp.

Deep-hardening silicon steel. No. 2,326,838. Walter Crafts to Electro Metallurgical Co.

Electroplating bath comprising an aqueous, acid solution of a nickel electrolyte of the class consisting of nickel sulfate, nickel chloride and mixtures thereof. No. 2,326,999. Rudolf Lind, William Harshaw and Kenneth Long to The Harshaw Chemical Co.

Coating a surface of metal of the class consisting of iron, steel, zinc and their alloys which consists in applying to the surface to be coated an acidulous, aqueous solution containing the NO_3 radical and a metal from magnesium to nickel, inclusive, in the electromotive series as its chief chemicals. No. 2,327,002. John Thompson to Parker Rust Proof Co.

Welding flux for magnesium base alloys. No. 2,327,065. Hans Reimers to The Dow Chemical Co.

Treating a tin surface bearing an oxide film to render the said surface substantially resistant to "yellow stain" by producing a protective phosphate film thereon. No. 2,327,127. Frank Rath.

Recovering a magnesium-base alloy from a dispersion thereof in the form of discrete fine globules in a spent metallurgical flux essentially comprising alkali- and alkaline earth-metal halides. No. 2,327,153. William Newhams and Charles Nelson to The Dow Chemical Co.

Forming molybdenum steel wherein the amount of surface chipping is substantially reduced. No. 2,327,209. Otho Otte.

Treating copper containing oxygen in amount providing a tough-pitch copper to increase the softening temperature thereof. No. 2,327,378. Albert Smith, Jr., and John Smart, Jr., to American Smelting & Refining Co.

Beneficiating a phosphate ore by flotation of a silica-containing concentrate therefrom. No. 2,327,408. Edward Ellis to Southern Phosphate Corporation.

Making bimetal thermostatic elements. No. 2,327,500. Thomas Chase to The Dole Valve Co.

Disintegrating antimony dross containing at least one other metal. No. 2,327,546. William Osborn and John Smith to Phelps Dodge Corporation.

Silver-containing free-machining die steel. No. 2,327,561. Howard Russell and Lloyd Jackson to Heppenstall Co.

Plating chromium upon a metallic member. No. 2,327,676. James Spence to Du-Repel Corporation.

Porous metal. No. 2,327,805. Roland Koehring to General Motors Corporation.

Process of finishing surfaces of ferrous articles. No. 2,327,870. Charles Coxe to Remington Arms Co., Inc.

Paints, Pigments

Making titanium containing pigments. No. 2,326,156. Andrew McCord to The Sherwin-Williams Co.

Forming an extended titanium-oxide pigment composed essentially of titanium oxide in the rutile form and calcium sulfate in the anhydrite form. No. 2,326,158. Andrew McCord and Harold Saunders to The Sherwin-Williams Co.

Preparing a titanium oxide pigment. No. 2,326,182. Seldon Todd, Harold Saunders and Frederic Verduin to The Sherwin-Williams Co.

Aryl-substituted hydrogenated cyclic compound and the process of producing same. No. 2,326,222. Heinrich Hopff and Wilhelm Rapp and Heinrich Rinke.

Producing a carboxylic acid chloride. No. 2,326,228. Morris Kharasch and Herbert Brown to E. I. du Pont de Nemours & Co.

Producing carboxylic acid chlorides. No. 2,326,229. Morris Kharasch and Herbert Brown to E. I. du Pont de Nemours & Co.

Lacquer for finishing artificial leather products consisting of a cellulose nitrate and a plasticizer. No. 2,326,992. Felix Bellac.

Phthalocyanine pigment having aluminum benzoate intimately incorporated to prevent any substantial appearance of flocculation with degradation of color, in coating films containing the pigment. No. 2,327,472. Vincent Vesce and Ferdinand Stalzer to Harmon Color Works, Inc.

Paper, Pulp

Making coated laminated paper. No. 2,325,584. Philip Barnhart to Westfield River Paper Co. Inc.

Petroleum Chemicals

Diesel fuel. No. 2,326,102. Edwin Nygaard and John McCracken and Francis Segar to Socony-Vacuum Oil Co. Inc.

Improved Diesel fuel comprising a hydrocarbon Diesel fuel oil blended with a minor proportion of an organic hydrochlorite. No. 2,326,522. Gould Cloud and William Sparks to Standard Oil Development Co.

Manufacturing lubricating oils comprising producing at least one low resin content mineral lubricating oil and a petroleum resin concentrate. No. 2,327,158. George von Fuchs and Hyman Diamond to Shell Development Co.

Separating wax from wax-bearing lubricating oil wherein the wax-oil

mixture is chilled to solidify the wax. No. 2,327,445. Edward Nill.

Method of controlling inflammability in motor fuels for high-compression spark-ignition engines, which comprises blending non-inflammable organic halide boiling below the limit of about 60° C. No. 2,327,708. Walter Herbst to Standard Oil Development Co.

Petroleum Refining

Dividing raw cracked gasoline into a first fraction of relatively high volatility and a second fraction of relatively low volatility. No. 2,325,581. John Allison, John Poole and Francis Grant to Lion Oil Refining Co.

Recovery and fractionation of light hydrocarbons. No. 2,325,588. David Brandt to Cities Service Oil Co.

Catalytic treatment of hydrocarbon oils. No. 2,325,611. George Keranen to Standard Oil Co.

Antioxygenic paper and paperboard containing 0.2% and 5% of deoiled spice residue. No. 2,325,624. Sidney Musher to Musher Foundation, Inc.

Recovering volatile condensable hydrocarbons from the liquids produced from oil wells producing fluids. No. 2,325,781. Harold Legatski to Phillips Petroleum Co.

Converting normally gaseous hydrocarbons to hydrocarbons boiling within a range suitable as liquid motor fuel. No. 2,325,813. John Throckmorton to The Pure Oil Co.

Rectifying gasoline. No. 2,325,839. du Bois Eastman and Loren Scoville to The Texas Co.

Manufacture of antiknock gasoline. No. 2,325,891. Clare Viland to Tide Water Associated Oil Co.

Manufacture of antiknock gasoline. No. 2,325,892. Clare Viland to Tide Water Associated Oil Co.

Production of non-knocking motor fuels. No. 2,326,166. Mathias Pier and Gerhard Free.

Conversion of hydrocarbons for the production of gasoline. No. 2,326,-186. Claude Watson to The Texas Co.

Catalytic cracking of hydrocarbon oil. No. 2,326,553. John Munday to Standard Oil Development Co.

Reacting isoparaffins with olefins to produce saturated, normally liquid branched chain hydrocarbons. No. 2,326,587. Hans Vesterdal to Standard Oil Development Co.

Condensing paraffins with monoolefins under superatmospheric temperatures and pressures in the presence of a catalyst mass No. 2,326,586. Hans Vesterdal to Standard Oil Development Co.

Reacting isoparaffins with olefins to produce saturated, normally liquid, branched chain hydrocarbons. No. 2,326,585. Hans Vesterdal to Standard Oil Development Co.

Breaking petroleum emulsions. No. 2,326,599. Gwynne Allen to Petrolite Corp. Ltd.

Breaking petroleum emulsions. No. 2,326,602. Gwynne Allen to Petrolite Corp. Ltd.

Producing gasoline from naphthenic and paraffinic oils heavier than gasoline. No. 2,36,628. Gustav Egloff to Universal Oil Products Co.

Improving the knock rating of a thermally cracked naphtha. No. 2,236,703. Ernest Thiele and George Schmitkons to Standard Oil Co.

Producing high octane number motor fuel from charging stock of the class consisting essentially of gas oil and heavier hydrocarbons. No. 2,326,705. Ernest Thiele, George Schmitkons, and Carl Hull to Standard Oil Co.

Making high grade motor fuel from naphthas in the boiling range of 200 to 420° F. No. 2,326,779. Eugene Houdry in Houdry Process Corporation.

Production of valuable non-knocking motor fuels. No. 2,326,799. Mathias Pier and Gerhard Free.

Production of gasoline from hydrocarbons boiling above the gasoline boiling range. No. 2,326,800. Mathias Pier, Wilhelm Fuener and Gerhard Free.

Treating a petroleum oil-bearing stratum by introducing into the well bore a water-soluble surface tension lowering compound. No. 2,327,-017. Leonard Chamberlain to The Dow Chemical Co.

Manufacture of high antiknock gasoline. No. 2,327,099. Du Bois Eastman to The Texas Co.

Catalyst control in hydrocarbon conversion. No. 2,327,175. Arthur Conn to Standard Oil Co.

Recovering distillate hydrocarbons from a high pressure well fluid. No. 2,327,187. Earl Hill to Stanolind Oil & Gas Co.

Isomerization of paraffin hydrocarbons to produce substantial yields of compounds more highly branched than the material subjected to treatment. No. 2,327,188. Vladimir Ipatieff and Herman Pines to Universal Oil Products Co.

Dehydrogenating normally gaseous paraffins. No. 2,327,189. Vladimir Ipatieff and Vladimir Haensel to Universal Oil Products Co.

Converting hydrocarbon oils by contacting at high temperature with powdered catalysts. No. 2,327,489. Sam Becker to Standard Oil Co.

Improving the color and reducing the corrosiveness of acid-treated petroleum hydrocarbons. No. 2,327,504. Charles Cohen to Standard Oil Development Co.

Conversion of hydrocarbon oils. No. 2,327,510. Roland Day to Universal Oil Products Co.

Chlorination of high molecular weight hydrocarbons. No. 2,327,517. Per Frolich and Lewis Bannon to Jasco, Inc.

Recovery of phenols from mineral oils. No. 2,327,526. Minor Jones and Barney Strickland to Standard Oil Development Co.

Sharply fractionating a hydrocarbon mixture in a fractionating column to obtain a bottoms fraction. No. 2,327,534. Pierre Lambert to The Lummus Co.

Sweetening a hydrocarbon distillate oil containing mercaptans following the dispersion of finely divided metal sulfides in the sweetened distillate product. No. 2,327,547. Henry Paulsen to Standard Oil Development Co.

Catalytic isomerization of saturated hydrocarbons. No. 2,327,593. Martin de Simo and Frank McMillan to Shell Development Co.

Production of motor fuel by reacting a low-boiling isoparaffin with low-boiling olefins and olefin polymers. No. 2,327,633. Frederick Frey to Phillips Petroleum Co.

Producing normally liquid synthetic predominantly branched paraffins lying within the motor fuel boiling range by the juncture of lower boiling paraffins with normally gaseous olefins. No. 2,327,634. Frederick Frey and Harold Hepp to Phillips Petroleum Co.

Conversion of normal and branched chain saturated hydrocarbons to branched and more highly branched chain saturated hydrocarbons. No. 2,327,670. William Ross and John Anderson to Shell Development Co.

Catalytic hydrocarbon conversion. Process and apparatus therefor. No. 2,327,746. Irving Shultz to Shell Development Co.

Method of separating light hydrocarbons from an absorption oil which has been enriched therewith by contact with a hydrocarbon-containing gas. No. 2,327,896. Glen Houghland to The M. W. Kellogg Co.

Process making high antiknock motor fuel hydrocarbons from a mixture of relatively light hydrocarbons containing isobutane, isobutene, 1-butene, normal butane and 2-butene. No. 2,327,926. Eugene Oakley and Lloyd Brooke to Standard Oil Co. of California.

Conversion of hydrocarbon oils. No. 2,327,973. Charles Thomas to Universal Oil Products Co.

Photographic Chemicals

Anthraquinone compound. No. 2,326,047. James McNally and Joseph Dickey to Eastman Kodak Co.

Producing a reversed dye image in a photographic silver halide layer containing a uniform dispersion of an azo dye. No. 2,326,055. Robert Morris to Eastman Kodak Co.

Photographic element free from halation. No. 2,326,056. Gale Nadeau and Alfred Slack to Eastman Kodak Co.

Antihalation film. No. 2,326,057. Gale Nadeau and Alfred Slack to Eastman Kodak Co.

Photographic stripping material. No. 2,326,058. Gale Nadeau to Eastman Kodak Co.

Producing subtractive photographic multicolor images of correct color registration. No. 2,326,500. Wilhelm Schneider and Heinz Schulze and Gustav Wilmanns to General Aniline & Film Corp.

Photosensitive material. No. 2,326,782. David Jacobus and John Bose to Keuffel & Esser Co.

Hardening and fixing bath for photographic gelatin layers. No. 2,327,-004. Walter Wadman and Loren Hurd, one-half to Eastman Kodak Co., and one-half to Rohm & Haas Co.

Making colored prints. No. 2,327,304. Garnet Grant, Jr., to Grant Photo Corporation.

Flexible light-sensitive element for use in preparing a photographic negative comprising a translucent paper which is impregnated with polyvinyl alcohol. No. 2,327,380. William Toland and Ellis Bassist to William C. Toland.

Ultraviolet filter. No. 2,327,764. Burt Carroll to Eastman Kodak Co.

Manufacture of vinyl resin film and sheeting. No. 2,327,765. Emmett Carver to Eastman Kodak Co.

Photographic emulsion for spraying upon surfaces and its application. No. 2,327,808. Wesley Lowe and Gerard Clarke to Eastman Kodak Co.

Photographic solution. No. 2,327,813. Gale Nadeau and William Tucker to Eastman Kodak Co.

Cellulose nitrate film. No. 2,327,814. Gale Nadeau and Austin Gould to Eastman Kodak Co.

Method for obtaining contrast control in photographic reversal printing processes. No. 2,327,822. Harold Russell and Howard Miller to Eastman Kodak Co.

Colloidal carbon antihalation layer. No. 2,327,828. Norwood Simmons to Eastman Kodak Co.

Resins, Plastics

Reinforced thermoplastic material composed of layers of a thermoplastic composition, alternating with layers of wood. No. 2,325,700. William Moss to Celanese Corp. of America.

Composition of matter comprising a resin prepared from cashew nut shell oil and a copolymer of butadiene-1,3 and acrylonitrile. No. 2,325,981. Donald Sarbach to The B. F. Goodrich Co.

Synthetic resin from polyacetoacetates of polyhydric alcohols and formaldehyde. No. 2,326,006. Herman Bruson to The Resinous Products & Chemical Co.

Preparing polyvinyl acetal resins. No. 2,326,048. James McNally, Charles Fordyce and Ralph Talbot to Eastman Kodak Co.

Urea-formaldehyde resin. No. 2,326,265. Pliny Towney to The Sherwin-Williams Co.

Preparing a methacrylic resin in a form suitable for use in molding compositions. No. 2,326,326. John Breedis to Rohm & Haas Co.

Preparing artificial teeth having a color gradation which comprises preparing a dough composed of methyl methacrylate monomer and methyl methacrylate polymer. No. 2,326,531. William Gates to Imperial Chemical Industries Limited.

Producing a powdered thermoplastic comprising mixing boric acid with a thermoplastic material. No. 2,326,539. Ernest Irany to Shawinigan Chemicals Limited.

Molding composition which comprises a homogeneous mixture of 100 parts of a copolymer of methyl methacrylate with 33% of its weight of a compound from the group consisting of styrene and vinyl acetate and from 33-300 parts of a polyvinyl acetal resin. No. 2,326,543. Maurice Macht to E. I. du Pont de Nemours & Co.

Molding composition comprising a phenol-formaldehyde resin, a filler for said resin consisting of comminuted cottonseed hull bran and hull fiber. No. 2,326,569. Fritz Rosenthal to The University of Tennessee Research Corp.

Composition comprising an acid-curing thermosetting resin and a latent curing catalyst selected from the group consisting of N-acyl imides and N-acyl sulfonamides. No. 2,326,725. David Jayne, Jr., and Paul Schroy to American Cyanamid Co.

Accelerator of the delayed action type and acid-curing thermosetting resin. No. 2,326,727. Paul Schroy to American Cyanamid Co.

Formaldehyde-urea molding composition comprising N, p-toluenesulfonyl ethanolamine as a plasticizer. No. 2,326,728. Paul Schroy to American Cyanamid Co.

Additional patents on resins, plastics, rubber, textiles, water sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES.

CANADIAN PATENTS

Granted and Published February 2, 1943. (Continued)

Improved method of preparing low sulfur, low phosphorus and low silicon metal for a rapid process of steel making. No. 410,332. Faredoon Pirojsha Mehta.

Laminated glass embodying a strengthening material having therein a treating agent comprising one ingredient capable of softening the strengthening material to an excessive extent and another ingredient incapable of softening the layer of strengthening material to a sufficient extent, both of said ingredients having high boiling points and low vapor pressure. No. 410,348. American Window Glass Company. (Frederic L. Bishop, Jr.).

Method of spot welding a cuprous conductor of a plurality of relatively fine strands. No. 410,365. Canadian Westinghouse Company Limited. (Philip E. Henninger).

Process for stapling and crimping textile fibres made from water insoluble vinyl resins. No. 410,373. Carbide and Carbon Chemicals Limited. (Edward W. Rugeley).

Process for making composite textile materials characterized by their crease resistance and retention of shape. No. 410,374. Carbide and Carbon Chemicals Limited. (Thomas F. Carruthers and William N. Stoops).

Method of insulating and cooling power transformers. No. 410,375. Cardox Corporation. (Harry Ensminger).

Glass composition consisting of silica, boric oxide, and alumina, the silica being from 91-95% and the alumina being from 4-8%. No. 410,376. Corning Glass Works. (Robert H. Dalton).

Method of forming relief printing sheets for use in water color duplicating process. No. 410,380. Ditto, Incorporated. (William J. Champion).

Wax-like composition for coating papers which may be melted and the paper dipped therein when coating the same, containing a large percentage of paraffin wax and a low percentage of an unmilled thermoplastic resinous powder prepared by treating rubber with a halide of an amphoteric metal, said thermoplastic resinous powder being added in the required proportions to increase the desired melting point of the paraffin wax and thereby increase the blocking point of the coating when passing through heat sealing means. No. 410,382. Dixie Wax Paper Company. (William H. Bryce).

Method of making cellulose derivatives, which comprises preparing an alkali cellulosate by reacting substantially anhydrous cellulose with an alkali metal in a medium of liquid ammonia and in the presence of an inert liquid aromatic hydrocarbon at a temperature below 25° C. and under the vapor pressure of liquid ammonia at the temperature employed. No. 410,386. The Dow Chemical Company.

Process for recovering molybdenum and tungsten from an impure material containing them. No. 410,388. Electro Metallurgical Company of Canada, Ltd. (George S. Smith).

Stable fluid spread base for use in producing an edible food product when mixed with a fat. No. 410,398. John F. Jelke Company. (Arthur K. Fisher and Lawrence F. Culkin).

Apparatus for polishing surgical catgut to uniform gauge and circular section. No. 410,399. Johnson & Johnson, Ltd. (Walter A. Cox).

Process for making laminated bodies such as plywood. No. 410,400. I. F. Laucks, Ltd. (Harry Galber and Theodore W. Dike)

Machine for coating pieces of candy with nut meats or other loose materials. No. 410,401. Walter M. Lowney Company, Limited. (Santy C. Petrilli).

Method of producing polyphosphate salts of phosphorus. No. 410,402. Monsanto Chemical Company. (Campbell R. McCullough).

Method of deriving carbon dioxide gas from a low pressure reservoir. No. 410,405. National Lead Company. (Joseph C. Dittmer).

Apparatus for drying articles coated with wrinkle finish composition with infrared and ultraviolet rays. No. 410,406. New Wrinkle, Inc. (Folsom E. Drummond).

Method of drying wrinkle coated films with infrared and ultraviolet rays in an oxygen-enriched atmosphere. No. 410,407. New Wrinkle, Inc. (Folsom E. Drummond).

Method of recovering sulfur dioxide from digester gases. No. 410,409. Paper Patents Company. (Horace A. DuBois).

Method of making sulfite pulp. No. 410,410. Paper Patents Company. (Donald C. Porter and Walter H. Swanson).

Production of an epi-cholesterol type of compound from a cholesteryl halide. No. 410,411. Parke, Davis & Company. (Russell E. Marker).

Preparation of 3-amino-4-hydroxy phenyl dichloroarsine hydrochloride. No. 410,412. Parke, Davis & Company. (Albert B. Scott, Oswald M. Gouhzit and James A. Sultzaberger).

Method of conditioning a stripping cathode formed of a corrosion resistant ferrous base alloy of chromium. No. 410,414. Plastic Metals, Inc. (John L. Young).

Process for preparing rubber hydrohalides. No. 410,417. Reynolds Research Corporation. (Earl H. Morse, William S. Johnson and Edward L. Mack).

Preparing cocoa product by mixing sugar and powdered cocoa of low fat content with a relatively small quantity of heated water, the sugar and cocoa crystallizing out as the mixture is cooled. No. 410,418. Rockwood & Co. (Carter F. Jones, Walter T. Clarke and Benj. J. Zeulea).

Production of methyl vinyl ketone by pyrolysis of acetoin acetate in presence of a substantially inert gas. No. 410,421. Shell Development Company. (Clyve C. Allen and Vernon E. Haney).

Exothermic reaction process for producing nitrobenzene. No. 410,422. Shell Development Company. (Hein I. Waterman, Jacob J. Leendertse and William J. C. de Kok).

Production of liquid hydrocarbon products from methane gas. No. 410,423. Shell Development Company. (Hein I. Waterman, William J. Hessells and Dirk W. Van Krevelen).

Oil-in-water emulsion insecticide and fungicide containing an oil-soluble copper compound in the oil phase and another copper compound dispersed in the water phase. No. 410,424. Shell Development Company. (Frank B. Herbert).

Manufacture of compounds of the type of estradiol esterified in 3-position. No. 410,428. Society of Chemical Industry in Basle. (Karl Miescher and Caesar Scholz).

Manufacture of a new hydroxylamino derivative of the benzene-sulfonamide-thiazole series. No. 410,429. Society of Chemical Industry in Basle. (Max Hartmann and Jean Druey).

Hydrogenating catalyst comprising a mixed silica and alumina gel having an apparent density between 0.4 and 0.65 combined with a compound of the class of oxides and sulfides of the metals of the sixth group of the Periodic System. No. 410,430. Standard-I. G. Company. (Gerald C. Connoully).

Production of sulfite cellulose by 2-stage digestion. No. 410,434. Stora Kopparbergs Bergslag Aktiebolag. (Erik S. Sandberg).

Process for the destructive distillation of carbonaceous material. No. 410,439. United Kingdom Coal Products, Limited. (John L. Strevens and Albert E. Waters).

Apparatus for obtaining contact between a stream of fluid and a mass of solid granular material. No. 410,440. Universal Oil Products Company. (John W. McCausland).

Method of producing 2-mercapto benzinidabolearsine oxides. No. 410,444. Winthrop Chemical Company, Inc. (Walter Herrmann and Friedrich Hampe).

Process for the saponification of marine and the like waxes. No. 410,446. Clough Chemical Company, Limited. (Harold Adams).

Delignification of lignocellulosic materials by treatment with a chlorite and removing the conversion products by means of an alkali solution. No. 410,454. Henry Dreyfus. (Stanley C. Bate).

Producing an androstendione of the general formula $C_{19}H_{26}O_2$ by oxidizing an androstenolone of the general formula $C_{19}H_{28}O_2$ with an agent capable of converting a secondary alcohol group into a keto group. No. 410,459. Walter Schoeller, Arthur Serini and Willy Logemann.

Process for the manufacture of azo compounds of acid character. No. 410,460. Max Dohon and Paul Diedrich.

Method for making physiologically active compounds of the stilbestrol type. No. 410,461. Arthur Serini and Konrad Steinruck.

Process for imparting permanent bactericidal properties to hairs and bristles. No. 410,465. Sam Rosenzweig.

Process for the production of pregnendiones by subjecting pregnendioles to the action of oxidizing agents capable of transforming a secondary alcohol group into a keto group. No. 410,466. Lothar Strassberger.

Granted and Published February 9, 1943.

Method of forming metal balls. No. 410,472. George E. Brenholtz.

Method of removing coloring matter from paper pulp made by an alkaline process. No. 410,477. Clarence E. Libby.

Process for the separation of beryllium from impure compounds. No. 410,502. Antioch College. (John E. Bucher).

Apparatus for treating cables and like articles in continuous lengths. No. 410,508. Callender's Cable and Construction Company, Limited. (Frederick Peel and Russell S. Vincent).

Preparing a resinous composition by refluxing under heat ethyl acetoacetate and an aqueous solution of formaldehyde in presence of a morpholine catalyst. No. 410,510. Canadian General Electric Company, Limited. (Gaetano F. D'Alelio).

Compound selected from the group consisting of N-(n-primary butyl)-aminophenols and N-(2-alkyl-n-primary-butyl)-aminophenols. No. 410,514. Canadian Kodak Company, Ltd. (Frederic R. Bean).

Artificial thermoplastic resin, including a vinyl halide therein, intimately combined with a stabilizing amount of at least one alcoholate of an alkaline earth metal. No. 410,515. Carbide and Carbon Chemicals, Limited. (William N. Quattlebaum, Jr.).

Hard, stiff, fibrous composition including a felted fibrous base and a fused resin comprising a residue low in abietic acid. No. 410,519. Federal Electric Company, Inc. (Herman W. Richter and Harold R. Gillette).

Method of making composite stock using metal powder. No. 410,520. General Motors Corporation. (Roland P. Koehring and Arthur R. Shaw).

Manufacturing ethyl cellulose by chipping lengths from a sheet of lightly felted fibrous cellulosic material, alkylating the chipped lengths by treatment with aqueous alkali and an alkylating agent, and recovering the cellulose ether formed. No. 410,522. Hercules Powder Company. (Alexander S. Finlayson).

Additional Canadian Patents granted and published February 9, 1943 will be given next month.

KRITTER KOTE
403,002

PERFECT VALVE
403,101

QUALITY MIXED
403,187

Buckingham
403,193

EMULSOYD
403,198

444,283

CIBA
444,285

"DEETEE"
451,966

SPAR-KALL
453,610

BESSIRE & COMPANY BESCO PRODUCTS
454,398

KREOLE
457,858

MID-TONE
457,939

SEMI - TONE
458,210

PROTECTIVE GRE-SOLVENT CREAM
458,799

ARASAN
458,902

Clinic
459,117

MEX
459,449

BEAUTY-TONE
459,560

Pennex
460,034

UNITOL
460,037

FENOXYL
460,095

TENAMINES
460,160

Plant MAINTENANCE
460,379

FENAMIN
460,424

FENANTHRA
460,425

OXI-PRUF
460,464

RED SPOT Zone-Tone
460,745

RESISTO
460,946

CUP DEFENDER
460,971

EUREKOL
461,129

WARCO
461,182

RID-SLUDGE
461,209

ATOPHAN-UROTROPIN
461,229

KLEN-A-GIZING
461,243

STRUCTOMOLD
461,257

UC
461,283

QUENCHOL
461,290

air-wick
461,390

461,416

JURNAPAK
461,450

MONOFIL
461,587

B-T-F
461,763

EXCELCIDE
461,792

dryad
461,795

LO-HY
461,828

O'LITE
461,930

SHAWNEE
461,954

POLYMEL
462,019

KELCO
462,314

RESIMENE
462,421

Trade Mark Descriptions†

403,002. W. H. Barber Co., Minneapolis, Minn.; filed Jan. 1, 1943; Serial No. 457,695; for hog oil and antiseptic; since July 1, 1942.

403,101. Pure Oil Co., Chicago, Ill.; filed Mar. 17, 1941; Serial No. 441,635; for lubricating oil; since Jan. 1, 1923.

403,187. Sears, Roebuck and Co., Chicago, Ill.; filed Feb. 19, 1942; serial No. 451,090; for house paints; since Nov. 26, 1941.

403,193. Buckingham Wax Corp., Long Island City, N. Y.; filed May 28, 1942; serial No. 453,319; for protective coatings; since July 1, 1936.

403,198. H. Kirk White and Co., Oconomowac, Wis.; filed Dec. 11, 1942; serial No. 457.354; for thinner in paints; since July 20, 1942.

444,283&5. Soc. of Chemical Industry in Basle, Basel, Switzerland; filed June 6, 1941; for synthetic resins; since Apr. 30, 1933.

451,966. Distributing and Trading Co., Inc., N. Y., assignor to Distributing and Trading Co., N. Y., a partnership; filed Mar. 28, 1942; for crude wax; since Oct. 15, 1941.

453,610. D. H. Buster Chemical Co., Kansas City, Mo.; filed June 12, 1942; for liquid floor cleaner; since Mar. 1, 1942.

454,398. Bessire & Co. Inc., Indianapolis, Ind.; filed July 22, 1942; for sulfuric and muriatic acids; since 1918.

457,858. Manhattan Kreole Products Inc., Brooklyn, N. Y.; filed Jan. 11, 1943; for leather dye; since March 1917.

457.939. Mid-Continent Paint & Lacquer Mfg. Co., Kansas City, Mo.; filed Jan. 15, 1943; for casein wall paint; since Mar. 3, 1941.

458.210. Mid-Continent Paint & Lacquer Mfg. Co., Kansas City, Mo.; filed Jan. 28, 1943; for ready mixed paints; since Apr. 29, 1938.

458.799. The Utility Co., Inc., N. Y.; filed Feb. 26, 1943; for protective cream; since Jan. 8, 1943.

458,902. Bayer-Semesan Co., Inc., Wilmington, Del.; filed Mar. 5, 1943; for seed disinfectant; since Feb. 13, 1943.

459,117. C. E. Jamieson & Co., Detroit, Mich.; filed Mar. 15, 1943; for medicinals; since May 25, 1932.

459.449. United Gilsonite Lab., Scranton, Pa.; filed Mar. 27, 1943; for cleaning compound; since June 1, 1933.

459,560. Beautykote Corp., Newark, N. J.; filed Apr. 1, 1943; for ready-mixed paints; since Mar. 10, 1943.

460,034. Pennex Products Co., Pittsburgh, Pa.; Apr. 20, 1943; for medicinals; since 1922.

460,037. Union Bag & Paper Corp., N. Y.; filed Apr. 20, 1943; for crude and refined tall oil; since Mar. 26, 1943.

460,095. General Dyestuff Corp., N. Y.; filed Apr. 22, 1943; for dyestuffs; since Apr. 8, 1943.

460,160. Rudolph Rebold, N. Y.; filed Apr. 24, 1943; for amino acids; since Apr. 3, 1943.

460,379. The North American Fibre Products Co., Cleveland, Ohio; filed May 3, 1943; for chemical compositions; since Feb. 26, 1943.

460,424. General Dyestuff Corp., N. Y.; filed May 5, 1943; for dyestuffs and industrial chemicals; since Apr. 30, 1943.

460,425. General Dyestuff Corp., N. Y.; filed May 5, 1943; for dyestuffs; since Apr. 30, 1943.

460,464. Advance Coatings Co., Fitchburg, Mass.; filed May 7, 1943; for protective coatings; since Apr. 29, 1943.

460,745. Red Spot Paint & Varnish Co. Inc., Evansville, Ind.; filed May 19, 1943; for washable interior wall paint; since May 8, 1943.

460,946. Murray L. Schuster as United Sanitary Chemicals Co., Baltimore, Md.; filed May 26, 1943; for floor cleaner; since June 1940.

460.971. Edward Smith & Co., Inc., N. Y.; filed May 27, 1943; for varnishes, paints; since Jan. 22, 1923.

461.129. The Berwind-White Coal Mining Co., Philadelphia, Pa.; filed June 4, 1943; for colloidal fuel composed of coal and oil; since Apr. 30, 1943.

461.182. Warich Drug Co., Richmond Hill, Long Island, N. Y.; filed June 5, 1943; for medicinals; since January 1942.

461.209. Rid-Sludge, Inc., Minneapolis, Minn.; filed June 7, 1943; for removing sludge deposits; since November 1941.

461.229. Schering & Glatz, Inc., N. Y.; filed June 8, 1943; for hexamethylenetetramine; since Feb. 1, 1924.

461,243. Dri-Wear Fur Processing Corp., N. Y.; filed June 9, 1943; for treating furs; since June 3, 1943.

461,257. McDonnell Aircraft Corp., St. Louis, Mo.; filed June 9, 1943; for resin impregnated sheets; since May 11, 1943.

461,283. Morris Morris as United Chemical Works, Chicago, Ill.; filed June 10, 1943; for fur cleaners; since Oct. 12, 1934.

461,290. Socony-Vacuum Oil, N. Y.; filed June 10, 1943; for quenching oils; since May 12, 1943.

461,390. Seeman Bros. Inc., N. Y.; filed June 14, 1943; for deodorant; since May 18, 1943.

461,416. Pennsylvania Salt Mfg. Co., Philadelphia, Pa.; filed June 15, 1943; for lye; since 1924.

461,450. Standard Oil Co. of N. J., Wilmington, Del.; filed June 16, 1943; for lubricating oils and greases; since May 17, 1943.

461,587. William W. Cheney, Pittsfield, Mass.; filed June 22, 1943; for engravers' wax; since Mar. 1, 1910.

461,763. Koch Chemical Co., Winona, Minn.; filed June 30, 1943; for chemical disinfectant; since February 1941.

461,792. Louis G. Guge, as the Huge Co., St. Louis, Mo.; filed July 1, 1943; for insecticides; since Aug. 3, 1939.

461,795. The Andrew Jergens Co., Cincinnati, Ohio; filed July 1, 1943; for deodorant; since May 15, 1943.

461,828. Socony-Vacuum Oil Co., Inc., N. Y.; filed July 2, 1943; for lubricating greases; since Apr. 29, 1943.

461,930. Obrien Varnish Co., South Bend, Ind.; filed July 8, 1943; for interior wall paint; since May 5, 1938.

461,954. Kentucky Color & Chemical Co.; Louisville, Ky.; filed July 9, 1943; for insecticides; since Jan 1, 1943.

462,019. Clifford G. Lacrosse, Baltimore, Md.; filed July 12, 1943; for compounding material for rubber; since December 1942.

462,314. Kelco Co., San Diego, Calif.; filed July 26, 1943; for algin product for use as hydrophilic colloid; since Feb. 1, 1930.

462,421. Monsanto Chemical Co., St. Louis, Mo.; filed July 31, 1942; for thermosetting resin adhesives; since May 14, 1943.

† Trademarks reproduced and described include those appearing in *Official Gazette of U. S. Patent, Office*, August 24 to September 14, 1943.